COLLEGE STUDENTS' PERCEPTIONS ON TOURISM CLIMATE CHANGE IMPACTS AND TRAVEL DESTINATION DECISION-MAKING

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Abstract

Climate and weather are widely recognized attributes that play important roles in tourism (Buzinde, Manuel-Navarrete, Kerstetter, & Redclift, 2010; de Freitas, 2001; Gössling, Bredberg, Randow, Sandström, & Svensson, 2006; Smith, 1993). For tourists, travel decisions are to a large extent based on destination images of sun, sand, sea, or availability of snow, and thus on perceptions of climate variables such as temperature, rain and humidity (de Freitas, 2001; Smith, c1993). However, according to United Nations World Tourism Organization (UNWTO) 2007 Davos declaration, the tourism industry contributes about 5% of global CO2 emissions. Since the college student travelers will become the main consumer population of global tourism market (International Youth Travel Organizations, 2003), studying college students' perceptions of tourism impacts on climate change issues are critical for tourism destinations and suppliers. The purpose of this study is to enhance the understanding about the relationship between tourism and climate change issues among college students, in addition, to evaluating the impact of gender on knowledge and perceptions of climate change issues among college students, and its effects on travel behavior change. Using an online survey link and printed questionnaire, data were collected from a randomly selected sample of college. And due to the convenience sampling method, the student samples were mainly from the School of Public Health, Indiana University Bloomington. The study found that only gender influences students' knowledge of travel's impacts on climate change. In general, climate change knowledge and perception levels cannot be attributed to gender differences. To some extent, university education has an impact on college students' climate change perceptions, and understanding of climate change knowledge.

Keywords: college students, climate change, gender, perceptions

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CHAPTER I

INTRODUCTION

Background

Climate and weather are widely recognized attributes that play important roles in tourism (Berrittella, et al., 2006; de Freitas, 2001; Smith, 1993; Gössling, et al., 2006; Buzinde et al., 2010). Many types of tourism depend on natural resources such as jungles, forests, mountains, rivers, lakes, beaches, and coastlines as well as the vistas and weather conditions associated with many of these landscapes (Buzinde et al., 2010). However, according to the United Nations World Tourism Organization (UNWTO) 2007 Davos declaration, the tourism industry contributes about 5% of the global CO2 emissions; in terms of radiative forcing, tourism contributes 4.6% of the greenhouse gases emissions related to global warming. Transportation, accommodation, and activity sectors all contribute a great portion of the CO2 emissions in tourism. Tourists' travel decisions, to a large extent, are based on destination images of the sun, sand, sea, or the availability of snow, and thus on perceptions of climate variables such as temperature, precipitation and humidity (de Freitas, 2001; Smith, 1993). Accordingly, increasing numbers of scholars are studying the impacts of climate change on tourist destinations, activities, and tourist behavior, as a result of altering weather and the environmental conditions at the destinations (Lise & Tol, 2002; Gössling, et al., 2006; Scott, et al., 2008; Hall, et al., 2015), in order to understand the climate change impacts on the entire tourism system.

Statement of the Problem

Studying tourist perceptions of environmental change is significant in tourism study, especially for those destinations which are sensitive to climate change (Gössling & Hall, 2006a; Hall & Lew, 2009; Scott, 2006; Scott, Jones & Konopek, 2008). The influence of climate change, however, is not completely negative. For instance, the case study in the nature-based tourism in the Canadian Rocky Mountains predicts that annual visitation of the park would increase under all of the climate change scenarios examined, but particularly under a warmer scenario (Scott, et al., 2007). The direct effect of a changed climate is projected to increase visitation by 6–10% in the 2020s (Scott et al., 2007). According to these studies, tourist perceptions of climate change might vary based on different cases, since numerous variables will influence the climate change perception among people. For example, in Gössling et al. (2012) study, the authors list the complexities of tourist perceptions in the context of climate change. Over ten characteristics and issues surrounding climate change perception are mentioned, including trip and travel motives.

Becken (2007) concludes that knowledge of climate change and other environmental impacts play an important role in relation to tourists' awareness and perceptions of climate change, as well as how tourists assess their individual responsibility. However, contradictions exist among tourist attitudes toward climate change. In the study, tourists show little specific knowledge about how air travel affects global climate change, though they are eager to know more information about such change. On the other hand, Becken (2007) also points out that those participants generally refused the mitigation option of reducing the number of flights and travel distance. This is because the value of freedom

to travel is firmly established in the minds of those frequently-global-travelling tourists who participated in the research. Another example is a study in Norway, the United Kingdom, and Germany, which demonstrates that research participants admit that climate change is happening, but they are unwilling to change their behaviors due to cost and mobility issues (Higham, 2014). From these previous studies, it was found that climate is complex, tourists' preferences on weather and climate are subjective and hard to evaluate, and a climate change perception-behavior gap exists among tourists. Accordingly, understanding tourists' issues of participating in responsible behaviors toward climate change are important for raising awareness and responsibility among tourists. Also, it is important to understand tourists' perceptions of climate change. Without understanding tourists' real concerns about climate change and its mitigation issues, government and other tourism related industries will not be able to create and implement effective climate change policies. However, few studies on this issue have focused on student populations. Since college student travelers are becoming the main tourism consumer population (Student and Youth Travel Association, 201; Federation of International Youth Travel Organizations, 2003), it is important to understand their real concerns about climate change in tourism.

Deficiencies in Past Literature

Scholars have indicated that the government plays an essential role in mitigating global warming through legislation and regulatory action, but they also emphasize the importance of voluntary consumer reduction in energy usage, especially in the absence of large-scale government interventions. In a large number of studies related to tourism and climate change, scholars put emphasis on exploring how to increase the possibilities of the

general public's participation in climate change mitigation, and the barriers that the policy makers need to be concerned about in real life. In those studies, however, tourists' or the general public's attitudes toward climate change are complicated and ambiguous (e.g. McCright and Dunlap, 2011; Kroesen, 2012; Higham, et al., 2014; etc.). They generally refuse the mitigation options of reducing the number of flights and travel distance in their lives (Becken, 2007), but also show a willingness to participate in the mitigation process. Thus, more studies are needed in this area in order to discover the most acceptable ways (to publicize climate change mitigation methods and the best ways to educate the general public on the importance of climate change mitigation not only in their respective travels, but also in their daily lives.

The other area in studying climate change is exploring the perceptions of climate change among the participants. In the early 90's, some scholars suggested that both understanding individuals' knowledge of the causes and consequences of climate change as well as the extent to which they regard climate change as harmful to their well-being are of importance. The aforementioned are important as they may correspond to the individuals' personal lifestyle decisions, voting behavior, and willingness to support climate change policy initiatives (Bostrom, Morgan, Fischhoff, & Read, 1994, as cited in Brody et al., 2008). Many tourism scholars also emphasize the importance of understanding tourists' perceptions of climate change (e.g. Gössling, et al., 2006; Becken, 2007; Lorenzoni, et al., 2007; Higham, et al., 2014; Kroesen, 2013; etc.). Some studies have been conducted in order to understand the perceptions of the general public toward climate change, however the results remain unsubstantiated, due to the infrequent nature of these types of studies.

There is an insufficient number of climate related studies in tourism studies. The reason might because it is hard to control climate in tourism activities and the constancy of climate (Berrittella et al., 2006). Recently however, increasing numbers of scholars have begun studying the effects of climate change on tourism destination decision making and addressed the importance climate plays in travel. In spite of the increasing number of climate related studies in tourism, the study results have shown, "climate" is more complex than just temperature. For tourists there is a consideration of a range of meteorological variables, such as: rainfall, humidity, storms, wind, etc., which all play a role in their decision-making (Gössling, et al., 2006; Scott, Gössling & de Freitas, 2008). Thus, more studies are required for exploring how climate can be measured in tourism study, and what methods are better for scholars to present climate change issues to the general public.

As mentioned above, few studies in tourism evaluate tourists' attitudes and sensitivity toward climate change based on tourist' level of climate change knowledge. Moreover, the participants in these previous studies were mostly working individuals, which means fewer college students were interviewed or tested in these studies. As one of the main future tourist populations and as future employees of the tourism industry, understanding college students' attitudes toward climate change issues in tourism is essential.

Purpose of the Study

With the increasing attention on climate change issues, growing numbers of studies focus on climate change and its impacts on the tourism industry and tourist behavior changes have been released (de Freitas, 2001; Lise & Tol, 2002; Bigano, et al., 2006; Hamilton & Lau, 2006; Gössling, et al., 2006; Becken, S, 2007; Buzinde, et al., 2010; Hares, et al., 2010; Gössling, et al., 2012; Kroesen, 2013; etc). The purpose of this study

is to enhance our understanding of the relationship between tourism and climate change issues among college students, in addition to, evaluating college students' level of knowledge on tourism's impacts on climate change, and its effects on travel behavior change. The result of the study could increase the understanding of the issues and limitations in climate change education among college students.

Significance of the Study

Climate change is currently a widely discussed issue, as well as a controversial one. In Europe and Australia, studies focusing on climate change, barriers of climate change mitigation, and climate change impacts on tourism have increased remarkably (Gössling, et al., 2006; Hamilton & Lau, 2006; Berrittellaa, et al., 2006; Coombes & Jones, 2010; Dwyer, et al., 2012; Hall, et al., 2013; Higham, et al., 2014), while in the tourism area, debate, skepticism, and denial of climate change problems exist among many tourists. However, climate change is extremely important in tourism because of its influences on the viability of tourism destinations and activities, and tourist behavior. According to tourists' travel motivations, climate is a crucial attractive factor of tourism destinations. Meanwhile, the attractive factors of travel destinations can be greatly influenced by climate change, such as weather pattern changes, beach erosion caused by globe warming, later bird arrival at bird watching sites, shortened skiing seasons, etc. Among these vulnerable natural attractive factors, sunshine, warm weather, and beaches are crucial spring break destination elements for U.S. students (Hobson & Josiam, 1996; Josiam et al., 1999; Klenosky, 2002; Kim, et al., 2007).

Based on a report by the Student and Youth Travel Association (2014), the youth traveler population has increased significantly around the globe, accounting for 20% of

global tourism. In the Federation of International Youth Travel Organizations (2003) report, young travelers are described as a group of “loyal repeat consumers”. The organization recommends that travel sectors focus on this market by providing specific products to meet young traveler’s needs. Furthermore, college student travelers will become the main consumer population of the global tourism market. In addition, they represent both future leaders and opinion-makers in society and will have a profound influence on the decision-making regarding the use and management of many natural environments (Ewert, Place & Sibthorp, 2005). Thus, studying students’ perceptions of tourism impacts on climate change issues are critical for tourism destinations and suppliers.

Delimitations

This study was designed using a quantitative research method, consisting of a survey questionnaire with 83 survey items, to determine college students’ perceptions of climate change, and to discuss the relationship between climate change issues and travel destination decision-making among the college student population. The sample population contained 381 participants in a convenience sample. The sample subjects covered the undergraduate students at Indiana University Bloomington. This study evaluated the level of student perceptions on climate change issues within the tourism industry, and their willingness to change their travel behavior change. But the long-term, real-life travel behavior changes, such as reducing air travel distance, switching a long-distance travel destination to a closer destination, and supporting climate change mitigation policies were not evaluated or tracked in this study.

Research Questions

In Brody et al. (2008), the authors found that women are more likely than men to be cognizant of the adverse impacts of global climate change. In environmental behavior studies, women are more aware of environmental risks and more readily support environmental and climate initiatives (Barkan, 2004; Brody et al., 2008; Diekmann & Preisendorfer, 1998; Dietz, Stern & Guagnano, 1998; Zelezny, Chua, & Aldrich, 2000, Ewert & Baker, 2001). From the previous study by Leiserowitz, (2005) and Upham et al. (2009) in the US and UK, skepticism was most common among men. Also, the 'white-male effect' has been widely observed across different environmental and technological hazards (Flynn et al., 1994; Finucane et al., 2000; McCright and Dunlap, 2011). Satterfield et al. (2004) also claim that risk perception may be related to individuals' interest in a particular hazard.

Also, several studies point out that cost is the main driver for tourists' unwillingness to behave pro-environmentally, even though they have high awareness of climate change issues. Higham et al. (2014) found that all their research participants mentioned cost as the key driver for environmental behavior toward climate change. Moreover, the study also found that the lack of convenient and efficient alternative transportion is another obstacle for travel method changes (Higham et al., 2014). Lorenzoni, et al. (2007) also points out that, in the UK, costly facilities, and inconvenience are also mentioned as reasons participants are unwilling to make behavior changes. Immediate financial concerns in the current economic climate might be the possible explanation for a lack of responsible behavior toward climate change and the environment (Weber, 2010).

For the tourist's decision making part, Gössling (2006) claims that in earlier studies, temperature and other climate variables are of great importance for the travel decisions of leisure tourists. Moreover, climate change would have a major impact on travel decisions and tourist flows. Hamilton & Lau (2006) also found in their study that temperature and rainy days are the major attributes of climate information which tourists want to know in their destination decision making processes. For students, warm and sunny weather is an important factor attracting them to the destinations (Kim, et al., 2006). Scholars emphasize that 'climate' is more complex than just temperature. Tourists consider a range of meteorological variables, such as: rainfall, humidity, storms, wind, etc., in their decision-making (Gössling, et al., 2006; Scott, Gössling & de Freitas, 2008). According to these studies, the role of climate variables need to be tested to understand the factors that may influence student's travel decision making.

Based on the objectives above, the following Research Questions will be tested:

RQ1: How important will students regard "Climate/Weather" in their travel destination decision-making processes? In this part, the study aims to understand the role of Climate/Weather attributes in students' destination decision-making process, compared to the other nine destination attributes.

RQ2: What is the general level of climate change knowledge among college students?

RQ3: How does gender difference influence the knowledge and perceptions of climate change issues among college students? This question will be asked in order to determine whether female students are more sensitive to climate change issues than male students. The purpose of this question is to develop a better understanding of the impact of gender

on climate change issues. The study assumes that female students are more sensitive to climate change issues, and, are more willing to take actions in their travel behaviors.

RQ4: Do students think about climate change impacts from their travel behaviors when they make destination decisions? If not, what factors will hinder them from considering climate change in their travel plans?

Definition of Terms

Climate Change: Climate change in the Intergovernmental Panel on Climate Change (IPCC) usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

Climate Change Perception: Risk perceptions of climate change can be described as a function of cognitive factors (i.e., knowledge about climate change), experiential processing (i.e., affective evaluations and personal experience) and socio-cultural influences (including social norms and broad value orientations)--controlling for key socio-demographic characteristics (van der Linden, 2015).

Destination Choice Process: The most widely accepted model of consumer decision making for non-routinized purchases is usually presented as a five-stage process: problem

recognition, search, evaluation, purchase, and post purchase evaluation (Crompton, 1992).

Summary

Climate change is a pressing issue in the United States. In the last decade, Indiana residents have seen some early impacts of climate change, such as record-breaking heat waves, droughts, cold spells, and a number of floods, including two one-hundred year flood events and one five-hundred year flood event (Hoosier Environmental Council, n.d.). An early study in the Southeastern United States shows that strong knowledge and perceptions of the climate change issues were prevalent, however, some uncertainties about the impacts and causes of climate change persisted (McNeal, et al., 2014). Based on the previous study of people's perceptions toward the climate change and tourism issue, the purpose of the study is to evaluate students' perceptions of the relationship between tourism and climate change. Moreover, the willingness of travel behavior changes due to the climate change impacts will also be evaluated in this study.

CHAPTER II

LITERATURE REVIEW

In recent decades, climate change has become a widely discussed topic that has attracted worldwide attention as increasing evidence suggests that the existence of climate change is occurring as a result of human activities. As a means of better understanding and curbing global climate change, the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) founded the Intergovernmental Panel on Climate Change (IPCC) in 1988. Gathering hundreds of researchers in the interest of addressing the assessment and offering evidence of global climate change to the general public. The IPCC is currently the leading international organization gathering in global climate change research. The IPCC assessment reports offer a clear scientific view on climate change knowledge as well as both its potential environmental and socio-economic impacts. Many scholars have based their studies on the finding inform IPCC's assessment reports (e.g. Becken & Hay, 2012; Berrittella, et al., 2006; Buzinde et al., 2010; de Freitas, 2001; Gössling, et al., 2006; Gössling, & Hall, 2012; Hegerl, et al., 2007; Le Treut, et al., 2007; Kajan & Saarinen, 2013; Scott, 2011; Scott, Scott et al., 2012; Scott & Matthews, 2011; Smith, 1993; etc.). Additionally, there is a steady emergence of studies geared toward furthering the understanding of both human perceptions on climate change and curbing human-induced climate change are emerging in large numbers (e.g. Brody et al., 2008; Hegerl, et al., 2007; Le Treut, et al., 2007; Gössling, et al., 2006; Poortinga, et al., 2011; Romero-Lankao, et al., 2014, etc.). Some previous studies refer to tourism industry as climate change contributor and tourism industry is sensitive to the change of climate (eg. Bulter, 2001; Berrittella, et al.,

2006; Buzinde et al., 2010; de Freitas, 2001; Gössling, et al., 2006; Scott & Lemieux, 2010; UNWTO-UNEP-WMO, 2008; etc.). The relationship between climate change and tourism has only been recently brought to the forefront of studies (e.g. Berrittella, et al., 2006; Buzinde et al., 2010; de Freitas, 2001; Gössling, et al., 2006; Smith, 1993; etc.), as difficulties have existed with regards to studying climate change's impacts on tourism. This difficulty can be attributed the fact that climate and weather preferences vary from tourists to Ctourists. Additionally, encouraging tourist's behavior change of climate change mitigation is challenging as public skepticism and the uncertainty of climate change issues, amongst other objective factors, such as cost, time consuming, convenience issue etc., influence tourists' behavior. The benefit of understanding tourists' perceptions on climate change is that it may play a role in climate change mitigation in tourism activities, improve climate change education, and inform future policy making efforts.

The following literature review segments will explore the conceptual framework of this thesis research. To begin this literature review, the definition, impact, and history of climate change research will be introduced. Then, the relationship between climate change and tourism, moreover, the importance for studying climate change in tourism study will be explained. The role of public perception plays in climate change mitigation, and the socio-demographic difference in risk perception will be explored to determine the necessity of studying socio-demography in climate change. Following the barriers that tourists face in their travel decision-making processes, the uncertainty of climate change and insufficient knowledge about climate change among general public will be

highlighted in order to support the necessity of studying public perception in climate change and tourism study.

Climate Change

The Intergovernmental Panel on Climate Change (IPCC) defines climate change as a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and the changes persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. Established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), the IPCC was created with the intent of assessing the specific information (scientific, technical and socioeconomic) in order to understand the risk of human-induced climate change (Le Treut, et al., 2007). The findings determined that climate change may be due to internal processes and/or external forces. While external influences, such as changes in solar radiation and volcanism, are natural variabilities of the climate system, other external changes, such as the composition change of the atmosphere that began with the industrial revolution, are the result of human activity (Hegerl, et al., 2007). In the past two decades, the evidence of human-induced climate changes has accumulated steadily. For example, the first IPCC Assessment Report, released in 1990, contained little observational evidence of a detectable anthropogenic influence on climate. Six years later, however, the IPCC Working Group I SAR (IPCC, 1996) concluded that "the balance of evidence" suggested that there had been a "discernible" human influence on the climate of the 20th century (Hegerl, et al., 2007). Additionally, findings from the IPCC Fourth Assessment Report

(2007) shows that is unequivocal that the warming of the global climate is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and finally, the rising global average sea levels.

In 2014, the IPCC's Fifth Synthesis Report concludes that anthropogenic greenhouse gas emissions have increased since the pre-industrial era, a factor largely driven by economic and population growth, and the reality of emission reaching the highest peak in history, during the years ranging from 2000 to 2010. Both growths global economic and population are the most important drivers of the increase in CO2 emissions from fossil fuel combustion, stem from global economic growth and population growth;, constituting for, 78% of the total GHG (Greenhouse Gas) emission increases, which took place between 1970 and 2010 (p.46) . In recent decades, changes in climate have impacted natural and human systems on all continents and across all oceans (p.49). For example, the influence of human activities has been detected in the increasing warming of the atmosphere and the ocean, changes in the global water cycle, and a reduced production in snow and ice. Lastly, it has been noted that global mean sea level is rising, which is highly likely to be the dominant cause of the warming observed since the mid-20th century (p.47). As aforementioned, climate change impacts both natural and human systems, and it will undoubtedly amplify existing risks, while creating new risks for natural and human systems (p.64). The IPCC (2014) lists four key risks that will influence all sectors and regions:

1. Severe ill-health and disrupted livelihoods that result from storm surges, sea level rise and coastal flooding, inland flooding in some urban regions, and periods of extreme heat.

2. Extreme weather events leading to breakdown of infrastructural networks and critical services.

3. Food and water insecurity and the loss of rural livelihoods and income, particularly for poorer populations;

4. Loss of ecosystems, biodiversity and ecosystem goods, functions and services.

As climate change impact is worldwide, the impacts of climate change in North America are often observable. The North American ecosystems are under increasing stress from climate change, including an increased occurrence of severe hot weather events over much of the USA, decreases in frost days, and increases in heavy precipitation over much of North America (Romero-Lankao, et al., 2014). In its 2014 report, the IPCC analyzes the climate change impacts in specific regional aspects. As seen in the "North American" report (IPCC, 2014), the USA has suffered economic losses due to extreme weather events, such as hurricanes, droughts, floods, and other climate-related hazardous productions. The extreme events interact with increases in exposed populations, infrastructure, and other assets and with the dynamics of such factors shaping vulnerability as wealth, population size and structure, and poverty (p. 1448). But, until 2009, the US government embarked on a government-wide effort "to have all federal agencies address climate change adaptation; to apply understanding of climate change to agency missions and operations; to develop, prioritize, and implement actions; and to evaluate adaptations and learn from experience" (The White House, 2009; Bierbaum et al., 2012). As climate change has a worldwide impact on natural and human system, it is crucial to disseminate information about climate change, the risks of climate

change, and the GHG emission mitigation strategies to the general public in order to garner more economical and moral support from this demographic.

The Relationship Between Climate and Tourism

Climate change has a profound impact on the tourism industry. It is widely recognized that weather and climate have important influence on the tourism sector (Berrittella, et al., 2006; de Freitas, 2001; Smith, 1993; Gössling, et al., 2006; Buzinde et al., 2010). A significantly, increasing numbers of studies on climate change and tourism have begun to appear in academic literature (Becken & Hay, 2012; Berrittella, et al., 2006; Buzinde et al., 2010; de Freitas, 2001; Gössling, et al., 2006; Kajan &Saarinen, 2013; Scott, 2011; Scott, Gössling, & Hall, 2012; Scott et al., 2012; Scott & Matthews, 2011; UNWTO-UNEP-WMO, 2008). To a large extent, tourism is impacted by weather and climate, and travel decisions is often signified through images of the sun, sand and sea, the availability of snow, the perceptions of the impact of climate variables such as temperature, rain and humidity (de Freitas, 2001; Smith, 1993). Though de Freitas (2003) states that characteristics of weather and climate are not necessarily "determinants" of tourism, but they constitute an important factor for tourism operators, financially speaking, as well as the personal experiences of tourists. Similarly, Scott & Lemieux (2010) claim that there is considerable evidence demonstrating the intrinsic importance of weather and climate for tourist decision-making. There is also considerable value placed on motivations, destination choice and timing of travel, as well as travel experience.

Tourism activities can also be a crucial contributor to climate change (Hall, et al., 2015). Tourism and travel contribute to climate change through emissions of GHG (which includes CO_2, methane (CH_4), nitrous oxides (NO_x), hydrofluorocarbons

(HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6) (Hall, et al., 2015). In 2005, tourism transportation, accommodation, and activities were estimated to have contributed to approximately 5% of the global anthropogenic CO2 emissions, which excluded non-CO2 GHGs (Scott et al., 2010; UNWTO-UNEP-WMO, 2008; World Economic Forum [WEF], 2009). In 2005, a credible estimate of tourism's GHGs emission totaled at approximately 8% (Gössling et al., 2013; Scott et al., 2010). Among the 5% global anthropogenic emissions of CO2 found in the tourism industry, 40% of the emissions are associated with aviation, car transportation (32%) and accommodation (21%) (UNWTO-UNEP-WMO, 2008). Furthermore, when considering the world's tourist population, figures reveal that only an estimated 2-3% of the world's population engage in international air travel in a given year (Peeters, Gössling, & Becken, 2007). Becken (2004), however highlights the fact that tourism has only recently gained attention as both an important contributor to climate change**,** because tourism industry's greenhouse gas emissions, especially its transportation part's emissions occupy a percentage of global GHGs emission, and as an industry that is potentially at high risk given predicted changes in the global climate from Gössling (2002a)'s study. In the past, tourism's role as a contributor to climate change has largely been neglected, with only few studies having previously dedicated time to investigate energy use and greenhouse gas emissions associated with tourist activities in the early 21st century (Becken et al., 2001; Becken, 2002; Gössling, 2000; Høyer, 2000). A similar attitude was also shared by Bigano, et al. (2006), who confirmed that tourism, as it relates to climate change, has not been thoroughly explored through the production of literature. This fact is surprising, as tourism not only affects climate change through carbon dioxide emissions, but also

through climate sensitivity. Some particular markets, such as sun, sea and sand mass tourism or winter sports tourism are obviously very sensitive to climate change. In 2003, WTO organized the first conference on Climate Change and Tourism. The very convening of this conference signaled the rising interest in the link between two global phenomena: tourism and climate change. At this stage, the main research objectives seem to focus on the threat of climate changes in travel destinations (König, 1998; Maddison, 2001; Viner & Agnew, 1999; Wall, 1998).

Travel Destination Choice and Climate Change

Tourism is one of the world's largest and fastest growing industries (de Freitas, 2003). Understanding the motivation of travelers is a significant topic for tourism studies. Tourists' decision-making processes are complex, as they involve multiple considerations ranging from destination choice to participating in leisure activities at the destination (Smallman & Moore, 2009). The area of travel interests is relevant to understanding the process of destination choice, as travel motivations concern themselves with understanding why people travel in general (Moscardo, et al., 1996). The theory posits that people collect and analyze information, eventually selecting an optimal solution that is presented among a wide range of alternatives (Edwards, 1954; Von Neumann & Morgenstern, 1944) that represents classic trends in each individual's everyday decision making processes. Everyday decision-making is based on people's ability to evaluate the advantages and disadvantages of each possible outcome, choosing the one most appropriate for achieving their desired objective (Smallman & Moore, 2009). Individuals use information evaluation and integration processes in order to make decisions, thus, the primary focus of many descriptive decision studies is to assess the importance of

information and an individual's cognitive ability to search and process it (Jeng & Fesenmaier, 2002).

Climate change will influence tourist's destination decision-making process on both the supply and demand sides. Generally speaking, for travel destinations, some tourism destinations are highly climate-dependent, such as ski resorts, and other snow-based destinations, the beach, et al. Hamilton & Lau (2006) claim that climate is one of the most important attributes in a tourist's destination decision making process, though in summary, temperature, rainy days, and water temperature are the components of climatic information with which tourists are most concerned. Climate is the principal resource upon which tourism destination is predicated (Scott & Lemieux, 2010). Similarly, Scott & Lemieux (2010) conclude in their study that climate affects the destination choice of travelers in the same way, in that climate highly influences the timing of travel. Seasonal demand is one of the main defining characteristics of global tourism, and is comprised of two elements: natural seasonality and institutional seasonality (Butler, 2001).

In contrast, the impact of climate change caused natural disasters will also influence tourists' evaluation of the destination, and then, influence the destination decision-making. As Kozak et al., 2007 mention in their study, high perceived risk and safety concerns have appeared to become a central issue of visitors' decision-making evaluations. Previous studies indicate that the natural incidents may have a devastating effect not only on the destinations, but also on the potential tourists' decisions when choosing a travel destination (Park & Reisinger, 2010; Sarman, et al., 2015; Kozak et al., 2007). Although some authors agree that the perception of risk in tourism may vary depending on tourists' characteristics and their cultural background, tourists can potentially change their destination choice,

when the risk makes a destination to be perceived as less safe (Reisinger & Mavondo, 2005; Park & Reisinger, 2010; Sarman, et al., 2015; Kozak et al., 2007). Climate change will ultimately influence the tourists' destination choices. When destinations' climatic resources are no longer suitable or attractive for certain tourism markets, or the change of climate causes great natural disasters, tourists will travel to more suitable and attractive destinations.

The Difficulty of Studying Climate Change Impacts on Tourism.

Numerous scholars describe the significance of temperature in econometric studies of climate and tourism demand. Temperature has been used as the representative variable for climate change studies. A number of studies, however, have shown us that climate is more complex than just temperature, with tourists considering a range of meteorological variables (such as rainfall, humidity, storms, wind, etc.) in their decision-making processes (Bigano, et al., 2006; Gössling, et al., 2006; Scott, Gössling & de Freitas, 2008). Bigano, et al., (2006) reveal three possible reasons for why most tourism studies focus on temperature: First, many climate parameters are strongly correlated to temperature, thus switching climate variables (i.e. cloudiness, humidity, and weather variability and predictability) would not change the final results much, and as statistical procedure, it would be difficult to distinguish one effect from the other. Second, temperature is the only climate variable for which there is reliable data and future projections with a large spatial coverage. Thirdly, of all the climate variables, information about monthly temperature, along with rainfall, appears frequently in travel literature (i.e. guide books, brochures and online tourism information), which can be easily accessed by the general public.

In spite of available information, studying tourists' climate preference can prove to be difficult, as they are subjective. A study from Mansfeld et al. (2003) shows differences in wind velocity and cloudiness have a significant influence on the tourists' comfort perception, but tourists who experience a destination's summer conditions are very different. Even under the same conditions, perceptions of comfort between domestic tourists and international tourists have quite different perceptions, which suggests the importance of other aspects, such as whether the tourists are visiting from warm, temperate, or cold climates.

Role of Public Perception in Climate Change Mitigation

An individuals' knowledge of the causes and effects of climate change, and the extent to which one regards climate change as harmful to his/her well-being are important. This is because the strength of one's aptitude about the aforementioned may correspond to their personal lifestyle decisions, voting behavior, and willingness to support climate change policy initiatives (Bostrom, Morgan, Fischhoff, & Read, 1994, as cited in Brody et al., 2008). In the world of tourism, a number of scholars agree that tourists can play an indispensable role in climate change mitigation (Becken, 2007; Gössling et al., 2006; Higham, et al., 2014; Kroesen, 2013; Lorenzoni, et al., 2007; Poortinga, et al., 2011). Poortinga, et al. (2011) point out that public perceptions and attitudes are critical to both the supply and the demand dimensions of the transition to a low-carbon economy. According to Linden (2015), previous studies conclude (e.g., Leiserowitz, 2006; O'Connor, Bord, & Fisher, 1999; Semenza et al., 2008; Spence, Poortinga, Butler, & Pidgeon, 2011; Spence, Poortinga, & Pidgeon, 2012; Tobler, Visschers, & Siegrist, 2012a) that risk perception is an important predictor of public

willingness to help reduce climate change. that Gössling et al. (2006) emphasize the important role of tourists' perceptions, as their understanding of climate change affects the flow of tourism, which would particularly affect those already warm destinations. Moreover, Gössling, et al. (2006) conclude that an analysis of tourist perceptions of climate change should also consider the tourists' understanding of their own role in this process. Other scholars present similar attitudes in their studies on tourists' perception of international aviation's impact on global climate change. For example, Becken (2007) points out that the implementation of market-based policies for aviation is likely to be more successful if some of the suggestions from air travelers are thoughtfully integrated, since the air travelers are the individuals who would be affected by these policies. Lorenzoni, et al. (2007) emphasize the crucial role of individuals in the voluntary reduction of energy use in the UK. Higham, et al., (2014) posit that the understanding of individual reactions to having responsibility in addressing climate change is important for the future of sustainable tourism to reformulate public flying behavior in light of climate change. Kroesen (2013) states that the viewpoints of travelers provide clues about the ways in which different clusters of travelers should be approached, which policies they would support and how they may be "educated" in order to lead more sustainable lifestyles. Generally speaking, it has been reported that tourists refuse to accept reducing the number of flights and travel distance as a greenhouse gas emission mitigation option (Becken, 2007).

Socio-Demographic Characteristics as Factors of Climate Change Risk Perceptions

In the past research from Helgeson et al. (2012), the socio-demographic factor is one of the four factors that has been suggested to be a key influential dimension of risk

perceptions of climate change, and the other three factors are cognitive, experiential and socio-cultural. In several past studies, females were found tending to have higher risk perceptions of climate change than males (Brody et al., 2008; Linden, 2015; O'Connor et al., 1999; Slovic, 1999; Sundblad et al., 2007). Additionally, a previous study conducted by Leiserowitz, (2005) and Upham et al. (2009) revealed that in the US and UK, skepticism was more common among men than women. This phenomenon, which has been referred to as the "white-male" effect (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000), observed widely across the different environmental and technological hazards (Flynn et al., 1994; Finucane et al., 2000; McCright and Dunlap, 2011). The "white-male" effect refers to the white males who typically report low environmental risk perceptions, and which are more conservative in their estimations made by other adult populations (Slovic, 1999; Flynn et al., 1994; Satterfield et al., 2004).

Furthermore, according to past environmental behavior studies, women are more aware of environmental risks and are more willing to readily support environmental and climate initiatives (Barkan, 2004; Brody et al., 2008; Diekmann & Preisendorfer, 1998; Dietz, Stern & Guagnano, 1998; Zelezny, Chua, & Aldrich, 2000, Ewert & Baker, 2001). Additionally, women tend to regard climate change as a great risk (Brody et al., 2008; Linden, 2015; Leiserowitz, 2006; Malka et al., 2009; O'Connor et al., 1999; Sundblad et al., 2007). A study from Ewert and Baker (2001) further substantiates this by highlighting the fact that females and older college students generally tend to be more pro-environmental than students who are younger and male.

In sociology research, a number of studies support the gender difference issue in climate change perceptions. One explanation of the gender difference in environmental

attitudes and support for environmental policies is based on gender socialization, which emphasizes the different values and social expectations conferred to boys and girls through socialization into their society's dominant culture (Chodorow, 1978; Gilligan, 1982). As indicated in McCright (2010), the different role expectations placed on boys and girls in the United States directly causes gender differences about environmental concerns, because in the United States, boys are preferred to be masculine, and girls are preferred to be feminine (McCright, 2010). A masculine identity emphasizes detachment, control, and mastery, while a feminine identity stresses attachment, empathy, and care (Keller, 1985; Merchant, 1980). Thus, the gender socialization concept may help explain why women are more concerned about environmental issues than are men.

Public Skepticism and Uncertainty on Climate Change Issues

Although most of the climatic scientists accept that climate change is happening, there is still a gap between scientific area and the perception of the general public on climate change issues. Perhaps this is because the general public view, as indicated in Weber (2010), is that since climate change is a slow, cumulative and largely invisible process, it cannot be experienced directly. A 2004 BBC poll (BBC, 2004) found that just over half of the British population believed that changing their own behaviors would have an impact on climate change. Another example of this can be found in a study that took place in Norway, the United Kingdom, and Germany, which shows that though research participants admit that climate change is happening, their behaviors would not change or change just slightly due to the reality of cost and mobility issues associated with travel (Higham, 2014). Moreover, in a 2009 Eurobarometer poll, 55% of the European public disagreed with the claim that emissions of carbon dioxide have only a

marginal impact on climate change while 30% of participants agreed that emissions of carbon dioxide have only a marginal impact on climate change. Within the United States, about only one in three people believes that global warming is caused mostly by natural changes in the environment (Leiserowitz et al., 2010a,b). Studies that refer to climate change perceptions also show the uncertainty, skepticism, and denial toward climate change (Leiserowitz, 2005; Upham et al., 2009; Hares, et al., 2010; McCright and Dunlap, 2011; Kroesen, 2012; Higham, et al., 2014). McCright and Dunlap (2011) argue that conservative white-males are more likely to express climate change denial views than other adults in the US. Even in the academic sphere, (one example being tourism), there are existing arguments about whether greenhouse gases emission mitigation will overshadow the tourism industry's benefits are in existence (Shani & Arad, 2014).

Insufficiency Climate Change Education and Adaption in the United States

Although climate change is an emerging issue, and is well recognized by the academic community, the general public still has a limited access to this issue. As illustrated by Linden (2015), the author found in the previous studies that climate change has consistently been perceived as a "very serious" problem by publics in the UK, Australia and most of continental Europe (Eurobarometer, 2014; Pidgeon, 2012; Reser, Bradley, Glendon, Ellul, & Callaghan, 2012) while concern has traditionally been much lower and less stable in the United States and China (Leiserowitz, Maibach, Roser-Renouf, Feinberg, & Rosenthal, 2014; Pew, 2010). The IPCC's 2014 Fifth Assessment Report determines that observed climate stresses that carry risks in North America include an increased occurrence of severe hot weather, heavy precipitation, decreases in frost days and declining snowpack. These climate change patterns will increase in

frequency and/or severity in North America in the next decades. Until 2009, the United States government initiated a government-wide effort "to have all federal agencies address adaptation; to apply understanding of climate change to agency missions and operations; to develop, prioritize, and implement actions; and to evaluate adaptations and learn from experience" (The White House, 2009; Bierbaum et al., 2012). An example of this occurred in 2010, when the US Department of Interior created Climate Science Centers integrated climate change information and management strategies into eight regions and twenty-one Landscape Conservation Cooperatives (Secretary of the Interior, 2010); and the US Environmental Protection Agency's Office of Water developed a climate change strategy (EPA, 2011). Among a handful of states, California, was the first state to publish an adaptation plan calling for a 20% reduction in per capita water use by 2020 (California Natural Resources Agency, 2009). Currently, the only type of support non-federal agencies received for climate change adaptation comes in the forms of technical and information support for; at present they are operating without direct financial support from the US government (Parris et al., 2010).

The adaptation of climate change in the United States still has a long way to go. Even though the USA is relatively devoted to its commitment to adapt climate change, there are significant restrictions and barriers on climate change adaptation. Financing issues (Carmin et al., 2012) is a typical example of an adaption barriers. Making changes to institutions in order to promote climate change adaptations can be costly (Marshall, 2013). Additionally, mismatched climate and development goals, political rivalry, and lack of national support to regional and local efforts (Brklacich et al., 2008; Brown, 2009; Sander-Regier et al., 2009; Sydneysmith et al., 2010; Craft and Howlett, 2013; Romero-

Lankao et al., 2013a) can all hamper the full fruition of climate change adaptation; in short, these are all significant barriers that plague the United States ability to address this problem.

Level of acculturation can often play a role in the formation of environmental concerns and attitudes (Caro & Ewert, 1995). There is a significant relationship between education level and the types of attitudes and perceived concerns of individuals possess regarding the states of the environment (Ewert & Baker, 2001). In spite of the aforementioned correlation found between educational level education and attitudes and concerns regarding the environment, overall education on climate change is insufficient in the United States. In 2011, the Yale Project (Leiserowitz, et al, 2011) examined climate change knowledge among teenagers and adults. The results indicated that relatively few teens have an in-depth understanding of climate change. About 25% received a passing grade (A, B, or C) in the test, compared to 30% of American adults. 54% of the teenagers received a failing grade (F) in the test, compared to 46% of adults. Furthermore, Román & Busch (2015) find that in the state of California, textbooks framed climate change as uncertain condition in the scientific community, particularly in the way it relates to its occurrence and its relation human-causation.

According to the findings of a 2015 Pew Research Center, only 50% of American adults agree that the Earth is getting warmer due to human activity. Based on the polling results, the public often adopts a 'wait-and-see' approach; this is further reflected by the fact that only 33% of the US public believes that climate change is a serious threat (Pew Research Center 2015).

The Difficulty of Transforming Scientific Information to the General Public

Barring political or economic reasons, delivering climate change information to the general public is difficult and time consuming. When it comes to the academic arena, it is estimated that only 3% of climate scientists disagree about the human-induced climate change (Cook et al. 2013). Contrasting this figure is the fact the general public's perceptions on climate change issues are either ambiguous or often skeptical. According to Rebetez (1996) this kind of phenomenon is the reason that people, the media, politicians and even scientists from other disciplines can only contextualize climate change issues largely on the basis of their own everyday experience, only able to contextualize when they feel that they themselves have been subjected to tangible signs of climate change. As a result of this, it is difficult for policymakers to receive and make use of information for decision-making purposes (Pielke, 1994). Kearney (1994) also concludes three possible reasons for the difficulty in transferring climate change information from scientific setting to the general public:

- The temporal scales associated with climate change are practically impossible for humans to have direct perception.
- Compared to the direct effects of air and water pollution, the vast spatial scales characteristic of global change is difficult to relate to the everyday life of the general public.
- Personal experience is hard to relate to a topic as abstract as global change issues.

From the tourism aspect, the question as to whether the tourism industry has a moral obligation to educate its tourists on the benefits of altering their travel behavior is a question rooted in moral values (Hall et al., 2014a). Stern, Dietz, and Kalof (1993)

showed that at least three value orientations underpin environmental attitudes and behavior, one of those being a social-altruistic value orientation, linked to concern for the welfare of other human being. The other value is of a bio-spheric orientation, as it is linked to concern over non-human species, also the biosphere. The third value is couched in egoism or self-interest; a pure orientation towards egoism suggests that any environmental concern would be based only on self-interest, wherein "an individual would favor protecting the environment when and only when doing so would outweigh the expected costs (Stern et al., 1993, p. 326)." The study showed that most people's environmental attitudes and behavior reflect some combination of the three values. In contrast to this, if the tourism industry wants to meet its target GHG emission mitigation goals, it will need to adopt practices that significantly reduce carbon emissions such as carbon caps, taxes, and trading schemes as well as incite greater encouragement for offsetting and behavioral change (Cohen et al., 2014; Dubois et al., 2011; Gössling et al., 2013; Hall, 2014; Peeters & Dubois, 2010). But those mitigation suggestions are "likely to have radical adverse impacts on the industry, again with little or no substantial benefit" (Shani & Arad, 2014 a). For tourists, those GHG emission mitigation suggestions will heavily inform their travel preferences and their associated costs. As mentioned in the previous section, in most of the climate change and tourism studies, tourists' environmental attitudes and behaviors are limited by travel issues as they relate to the cost and convenience of the experience.

Summary

Climate change is an emerging issue worldwide. The impact of climate change on tourism also needs to be understood in the context of all elements of the tourism system

rather than solely focusing on destinations, as climate change effects in tourism generating regions and tourists' propensities to travel will also affect economic well-being in those countries, also, tourists' propensities for travelling to those countries (Hall et al., 2015). Climate has a close correlation to tourism on both the demand and supply sides. Some tourism destinations and activities require specific climatic resources, thus the change of climate or extreme climate events can profoundly impact these climate-sensitive destinations. Otherwise, the increasing numbers of heatwaves, extreme events, abnormal rainfall, forest fire, warming winter, etc. will push tourists away from the old destinations to new ones. On the other hand, tourism activities induce climate change by the increasing GHG emission from transportation and accommodation. Currently, increasing attention is paid to climate change issues. Understanding university students' perception and attitudes toward climate change issues is necessary for the tourism industry and natural environment management. But few studies have focused on university students' knowledge and perception on climate change. University students represent both future leaders and opinion-makers in society. Their attitude toward climate change issues will influence the future policy making. Therefore, understanding university students' issues and barriers as they relate to climate change mitigation in travel will help to identify the current disadvantages of mitigation methods Moreover, studying university students' perceptions and knowledge level of climate change could help educators better understanding the shortage of climate change education among students on campus and figure out the most effective way to disseminate climate change knowledge to the public.

CHAPTER III

METHODS

In this chapter, the methods and procedures that explore the three research questions examined in this study are described in detail. The socio-demographic characteristics of students, their evaluation of climate change knowledge, students' awareness of the impact of their travel behavior on climate change, the role of climate in students' destination decision-making, and the issues that limit students' consideration of climate change issues in their travels are measured in this chapter. This chapter is organized into the following sections: research design, sampling plan, pilot study construct measurement, data analysis, and summary.

Research Design

In the first section of the study, participants were asked to rank ten destination attributes taken from Hamilton and Lau (2006). Heung & Quf (2000) define destination attributes as a set of attributes that describe a place as a travel destination. Destination attributes are important to both destination and tourists' decision-making processes. As concluded by Etchner and Ritchie (1993), every destination has a combination of functional or tangible attributes and psychological or abstract attributes. As tourists generally have limited knowledge about a destination that they have not visited, they often choose their travel destinations based on symbolic information acquired either from the media or from social groups (Mok & Armstrong, 1996).This aids in the exploration of the first research question, which asks about the kind of destination attributes and information students consider and collect before destination decision making. The second

and third research questions, which ask about the general knowledge level of climate change, and if climate change related knowledge and perceptions differ by sex, are an analysis of the participants' responses to the climate change knowledge and perception scales; responses to this question were separated and analyzed by sex. The fourth research question, which comes in a later section, includes eight questions, and inquires about the factors that influence students' consideration of climate change during their travels. A structured questionnaire was administered randomly to a sample of Indiana University, Bloomington's students. The convenience sampling method was used in the data collection process. Students could ask for an exemption from participating in the survey. There was a brief explanation of the survey and its purpose was detailed, in addition to the time consumption of the survey, which includes information about its purpose, and an estimate of how long the survey was expected to take. All of these were disseminated prior to the administration of the survey.

The survey was organized into four sections basing on the research questions. And the survey was developed from the previous research findings and instruments exploring climate change and tourism (McNeal et al, 2014, IPCC, 2014, Kroesen, 2013, Hares et al, 2010, Dickinson et al, 2013). Finally, the study measurement was integrated into the following sections:

a.) Climate and weather attributes that inform participants' decision making.

b.) Students' understanding of climate change and how climate change is impacted by tourism activities.

c.) Issues that influence travel behavioral change.

There are two main reasons for choosing students as the participants in this study. Firstly, the student sample is conveniently accessible, as it is on campus. Secondly, the student travelers' demographic will increase substantially (Student and Youth Travel Association, 2014), though, it should be noted that on a global scale, a student sample does not, at present, represent the perceptions of an entire population. According to Student and Youth Travel Association (2014), it has been projected that the student population will become the most populous consumer demographic in the global tourism market. The reason for using a questionnaire in lieu of other methods is that it will allow students with different backgrounds to have equal opportunity to be studied in a randomly delivered survey.

Pilot Study

In the interest of creating a survey that uses clear and unambiguous language, and avoids obvious errors and omissions, a pilot study was conducted before the survey questionnaire was administered. The results of the pilot study were used to refine the questionnaire. As mentioned in the previous studies, a pilot study is often recommended by the researchers to address issues of poor diction, errors and omissions, as well as to estimate response rate and investigate the feasibility of a study (Johanson & Brooks, 2010). This pilot study included students who were voluntarily asked to participate in and provided feedback, regarding the questionnaire. A two-phase approach was applied in this pilot study. During the first term, six participants were asked to critically evaluate the accuracy of language use, the errors and unclear parts of the questionnaire, and the repetitive parts of the survey. Each participant was asked to give feedback and suggestions for improvement. After this term, some items in the questionnaire were reworded for easier

understanding and the readability. The second term was processed a week later. Sixty-eight undergraduate students voluntarily participated in this term. Among the participants, nine of them were male students, and the other fifty-nine were female students. The data of the second term were statistically tested by SPSS 24 (Statistical Package for the Social Scientist). After the pilot study, a gender disparity among the participants was found. However, as a convenience sample of students was used for this study, no intervention was done in the later data collection process to narrow the gender disparity. And the comments and reviews from the two-phrase approach were used to improve the language use and errors in the questionnaire. Moreover, three items: "Major", "Ethnic Group", and "Family Income Range" were added into the Socio-Demographic section to obtain more detailed background information from the students.

Sampling Plan

A convenience sample of students was used for this study. A two-way ANOVA (Analysis of Variance) test was applied to compare the differences between and within sex groups and class level groups. As the 2015 data show, there are around 48,514 students enrolled at Indiana University, Bloomington. The sample size of this study was based on the sample size calculation formulation from Cochran (1963, p. 75) at a 95% confidence level and ±5% precision. The formulation is n (sample size) =n0/ 1+ (n0-1)/N (N=sample size), which n0= t2*p*q/ d2 (t=value for selected α level of 0.025 in each tail=1.96; d is the desire level of precision=0.05; p is the estimated proportion of an attribute that is present in the population; and q=1-p). Thus, according to the formulation, this study is designed to collect responses from a minimum of 381 students,

which implies that when the sample size reaches 381 students, the sample can be considered a strong presentation of the study population.

For sample collecting, the online questionnaire design and collecting software Qualtrics was utilized to send the questionnaire to the students and to collect responses. Qualtrics is an online questionnaire design application, which can be used to customize the questionnaire and send the questionnaire link to the email addresses of the desired participants. There are some advantages to using Qualtrics in this study. First, the responses that are collected by Qualtrics were automatically stored in the Qualtrics account. Second, using Qualtrics could prevent instances in which duplicate sets of responses are received from single participants. Qualtrics can prevent this from happening, as the participants were asked to sign in to their student account in order to use and fill out the form, however their usernames were recorded. Third, Qualtrics accounts were provided by the School of Public Health, Indiana University, Bloomington. Qualtrics can ensure data confidentiality; short of the author, no other people can access the data without permission.

At the beginning of the data collection, student service assistant/specialists from different departments in Indiana University Bloomington were contacted in order to send the questionnaire link through an email list of undergraduate students. Finally, only the student service assistant in the School of Public Health helped send emails with the questionnaire link to all the undergraduate students in the School of Public Health. The emails briefly described the purpose of the study, the content, and the anticipated time of completion for the survey, with the link to the survey questionnaire. A note was also sent within the email to remind the students not to retake the questionnaire.

In order to achieve the highest possible response rate, several course instructors in different departments were contacted in advance to see if they would be willing to give the author the chance to present the study in their classes. Three instructors agreed to post the online survey link to the students in their class. Another three instructors allowed data to be collected in their classes. All the participants were voluntary, and 8 participants dropped out of the process halfway. All of the participants' information was confidential, and did not affect their class grades. Participants' information and survey results are stored in both the author's computer and Qualtrics account. Other people are not allowed to review the original copies of the survey. At the end of the data collection, the number of returned surveys was 386. Among the samples, five graduate students' surveys were eventually removed from this study, since the study is focusing on undergraduate students. As a result, a total number of 381 undergraduate students are analyzed in this study.

Construct Measurement

In this study, two-way ANOVA analyses were employed. The questionnaire was constructed on the basis of the findings of previous studies (Hamilton & Lau, 2006; Hares, et al. 2010; McNeal et al., 2014, IPCC, 2014, Kroesen, 2013, Dickinson et al., 2013; Leiserowitz, et al., 2011). Demographic questions such as sex, age, major, and education background, were asked at the end of the questionnaire.

Attributes that Influence the Choice of Travel Destination

The first question in the questionnaire asked the participants to evaluate ten destination attributes, which they may consider in their travel destination decision-making process. Hamilton and Lau (2006) chose these specific ten destination attributes

based on previous destination image studies (eg. Baloglu &Mangaloglu, 2001; Baloglu & McCleary, 1999; Chaudhary, 2000; Fodness & Murray, 1999; Gallarza et al., 2002; Hu & Ritchie, 1993; Kozak, 2002; Lohmann & Kaim, 1999; Phelps, 1986; Yaun & McDonald, 1990). Hamilton and Lau (2006) picked the five highest valued destination attributes from those studies and calculated the frequency of those destination attributes, and finally, took the ten most frequent from their analysis. The attributes are shown in Table 1. Using Hamilton and Lau (2006), participants were asked to rank ten destination attributes from 1 (highest) to 10 (lowest). The results of Hamilton and Lau (2006) illustrate that climate/weather is in the top three important issues that tourists consider in their travel destination decision-making. In this study, participants were asked to rank all of the ten destination attributes, and the ten destination attributes were treated as ten independent variables, using SPSS 24 to determine if the results are similar to Hamilton and Lau (2006). The purpose of this section is to answer the research question about the roles in which climate/weather attributes play in destination decision making.

Table 1: Destination Attributes in Travel Destination Decision-Making

Dimensions	Measurement Items
Destination attributes	Access to the sea/lakes
	Accommodation
	Climate/Weather
	Cuisine
	Cultural/historical attractions
	Ease of access
	Hospitality
	Nature/landscape
	Price
	Sport and leisure activities

Knowledge and Perceptions of Climate Change

The second section of the study was based on a previous study from Kroesen (2013), McNeal et al. (2014), and the 2014 IPCC report. In this section, the questions were shown to the participants in order to evaluate their knowledge and perceptions of climate change. Following the study by McNeal et al. (2014), this section was divided into two parts: the knowledge dimension and the perception dimension. Questions that follow a five-point, Likert-Type format were applied in this section. According to the study, the response scale is from 0 (Don't know) to 4 (strongly agree). For the purposes of this study, the statements and measurement items in these dimensions were chosen from the studies by Hall et al. (2015), IPCC report (2014), and McNeal et al. (2014). In the knowledge dimension (42 items), the response scale ranges from 0 (Don't know) to 4 (strongly agree), which correspond with the following sentiments: "Don't know" "Strongly disagree," "Disagree," "Agree," and "Strongly agree." In this knowledge dimension, there are seven measurement items called "Reverse items". Following McNeal et al. (2014), these seven "Reverse items" were used to evaluate participants' misunderstanding of climate change knowledge. The mark "R" was not be printed in the survey in order to prevent misunderstanding and biased results from participants. These seven items were placed with other items in the study to explore the misunderstanding and misinformation on climate versus weather, greenhouse gases, and climate change. In these measurement items, the response scale 1 "strongly disagree" represents a thorough understanding of climate change, whereas the response scale 4 "strongly agree" represents the lowest understanding of climate change knowledge. The statements of knowledge dimension are listed in Table 2.

Table 2: Climate Change Knowledge Dimension

Dimensions	Measurement Items
Statement 1: The cause of Climate Change	Climate change is an inevitable natural process of earth. Climate change is caused by the human activities, due to the anthropogenic Greenhouse Gas emission.
Statement 2: To what extent, the following affects the globe temperature	Volcanic eruptions Dust in the atmosphere Clouds Carbon dioxide Greenhouse gases Methane
Statement 3: Which of the following contribute to global warming	Automobiles/trucks Deforestation Burning fossil fuel for electricity The hole in the ozone layer (R) Chlorofluorocarbons
Statement 4: The constitution of greenhouse gases	Greenhouse gases Carbon dioxide Methane Hydrogen (R)
Statement 5: Impacts of climate change	Food production Changes in animal migration Changes in ecosystem More UV radiation An increase in ozone hole size Death of coral reef Sea-level rise Glacial melt Arctic ice melt Increases in heavy precipitation Hot weather Decreases in frost days Declining snowpack More intense droughts Increases in wildfires Economic impacts
Statement 6: How travel influence climate change	Car transport Cruise ships Flying to the destination/Air travel

	Accommodation
Statement 7: Misunderstanding of climate change	Climate and weather are the same thing.(R) Climate changes from year to year. (R) The Earth's climate has been the same for thousands of years.(R) Climate is the average weather measured over long periods of time. The Earth is cooling, not warming. (R) Weather changes from year to year. Global warming is more beneficial than harmful.(R)

Note. R= Reverse items

In the perception dimension (23 items), the design of the statements are based on the studies from Kroesen (2013) and McNeal et al. (2014). This dimension is predicated on the two following statements: beliefs about climate change and source of climate change information. For the first statement, items are scaled from 0 (Don't know) to 4 (strongly agree), which will correspond with the following sentiments: "Don't know", "strongly disagree," "disagree," "agree," and "strongly agree." The response scale of the remaining statement is from 1(not at all) to 4 (a lot), thus, the full range of responses read as the following: "not at all," "a little," "some," "a lot." The measurement items are listed below in Table 3.

Table 3: Climate Change Perception Dimension

Dimensions	**Measurement Items**
Statement 8: Perceptions of climate change	Global warming is a very important issue for me. I am well informed about the problem of climate change. Climate change is not as urgent as other problems (e.g. poverty) Probably the effects of climate change will only become visible in dozens of years. It is already too late to prevent climate change. Media coverage is exaggerated about global warming. There is solid evidence that human-induced climate change is occurring. Government should established programs to response to climate change.

Statement 9: Resources for climate change related information	Television Radio Internet Books magazines Newspaper Family/Friends Movies Museums, zoos, aquariums Government agencies Governmental offices, such as NASA Environmental groups Class of university Scientists Public hearing/Events/Lectures

Issues Influencing Travel Behavior Change

The design of the questions in the final part (eight items) of the questionnaire are based on a study by McNeal et al. (2014). The first seven Likert-type questions are scaled from 0 (Don't know) to 4 (strongly agree), and correspond to the following sentiments: "Don't know", "Strongly disagree," "Disagree," "Agree," and "Strongly agree." And, the last one in this section is an open-ended question. The participants were asked write down any other issues that might influence them considering climate change in travel.

Table 4: Issues in Changing Travel Behavior toward Climate Change

Dimensions	Items
Statement 10: Issues in changing travel behavior toward climate change	I consider climate change issues in my travel destination decision-making. My contribution is as a drop in the ocean. There is not much I can do. I can do little to change my travel behavior. Flying is the only option to cover large distances in my travel.

The cost plays an important role in my travel destination decision making process rather than climate change.

I find it important to reduce my GHG consumption in my travel.

The continuous growth in consumption is the most important barrier for sustainable development.

Others

The SPSS 24 (Statistical Package for the Social Scientist) computer program was used to analyze the data of this study. In the study, the statistical model involving two-way ANOVAs were applied. For the first section of the study, the SPSS 24 was applied to calculate the average mean of each destination attribute. The means were compared to determine how important Climate/Weather attributes are in participants' destination decision-making processes. In this section, the higher the mean of the item, the less important the item is in participants' destination decision-making processes. In the second section, a two-way ANOVA (Analysis of Variance) was applied to compare the interaction between the sex groups and class levels. Sex and class level were treated as independent variables in this section. The seventy-five items in section two were categorized into nine categories (causes of climate change, things affecting global temperature, factors contribute global warming, the constitution of greenhouse gases; impacts of climate change, travel influence on climate change, misunderstanding of climate change, beliefs about climate change, sources of climate change information, trusted sources of climate change information, and issues in changing travel behavior) according to a study of McNeal et al. (2014). The two-way ANOVA uses the average mean of each statement to compare the difference, except for the "Perceptions of climate change" (statement 8) and "Resource for climate change related information" (statement 9). The means of the items in these two statements were compared individually. Because

the “Perceptions of climate change” (statement 8) was designed to evaluate the perceptions of climate change, and the “Resource for climate change related information” (statement 9) was designed to determine the trusted sources of climate change knowledge. The two-way ANOVA is an extension of the one-way ANOVA, involving two independent variables to determine if there is a significant difference in the main effects or interaction (Bluman, 2004). The independent variables in this study are female and male. For this study, two-way ANOVA could include the interaction term between gender and class levels in the test procedure. For the third section, the SPSS 24 was applied to calculate the average mean of each item. And the two-way ANOVA was used to evaluate the influence of gender and university educational level on students’ answers. The last item in this section asked students to write down the factors or issues that cause them to neglect climate change issues in their travel decision-making processes, and those factors or issues need to be different from the items listed in Table. 4. Due to the subjective character of this item, its responses were not treated by SPSS 24. All of the responses were listed together, and the identical responses of this item were sorted into the same group. Among the 381 surveys, only seven participants answered this item. And their answers are listed in Chapter IV.

Summary

In total, eighty-three items are included in this study. A sample size of 381 participants was utilized for the statistical analysis. The participants were asked to rank ten destination attributes to determine if Climate/Weather is the most important factor to consider during the travel decision-making process. In this section, seventy-five items relating to climate change knowledge and perceptions were utilized in order to evaluate

participants' attitudes toward climate change and tourism. In addition to an exploration of issues that influence participants' travel behavior change, an open-ended question was asked in order to determine if there is any information pertinent to the study that was not being addressed among the student population. The two-way ANOVA test was the primary statistical method administered in the treatment of this survey's data. The entire survey design was based on the previous studies from McNeal et al. (2014), IPCC (2014), Kroesen (2013), Hares et al. (2010), and Dickinson et al (2013). On account for the different study purposes and backgrounds, however, only some of the measurement items were selected and used from the previous studies in order to fit this study.

It should be mentioned that, there are some limitations that exist in this survey. For example, demographic variables, especially, age, education level, and cultural background, are limited due to the student sample. And, due to the student sample's ability to represent only the young adult population, participants may not have as much travel experience as their older counterparts, and as a consequence of this fact, their respective travel behaviors may differ.

CHAPTER IV

RESULTS

This chapter analyzes the demographic characteristics of participants, as well as the descriptive analysis of both independent and dependent variables. Furthermore, statistical tests are conducted to address the four research questions of this study.

Descriptive Analysis

The socio-demographic characteristics of the participants of this study are summarized in Table 5. The total number of returned surveys was 386. Among the samples, five graduate students' surveys were eventually removed from this study, since the study focuses on only undergraduate students. As a result, a total number of 381 undergraduate students are analyzed in this study. Female students occupied 85.3% of the survey participants while the remaining 14.7% participants were male students. The distribution of university educational level (i.e. advancement from freshman to senior year), demonstrates that the majority of participants are sophomores and juniors, 30.71% and 28.87% respectively. Among the 234 students who reported their ethnic group, 83.33% of them identified as Caucasian. The participants were from 54 different majors, with 20 of the majors being in the School of Public Health. Most of the participants majored in Tourism, Hospitality, and Event Management (48.3%), and Recreational Therapy (10.3%).

Table 5. Socio-demographic Characteristics of the Residents

Characteristics	Dimension	Frequency	Percentage
Gender	Female	325	85.3%

	Male	56	14.7%
Total		381	100.0%
Class Level	Freshman	55	14.4%
	Sophomore	117	30.7%
	Junior	110	28.9%
	Senior	99	26.0%
Total		381	100.0%
Ethnic Group	Caucasian	195	83.3%
	African American	13	5.6%
	Hispanic/Latino	14	6.0%
	Asian	8	3.4%
	Native American/Alaska Natives	0	0.0%
	Other	4	1.7%
Total		234	100.0%
Major	Tourism, Hospitality, and Event Management	184	48.3%
	Recreational Therapy	39	10.3%
	Sport Marketing and Management	14	3.9%
	Community Health	13	3.4%
	Exercise Science	12	3.2%
	Others	119	30.9%
Total		381	100.0%

As illustrated in Chapter 3, the first section of the survey asks participants to rank their travel destination attributes from 1 (highest) to 10 (lowest). For example, when a student considers his/her travel destination, the first destination attribute appearing in his/her mind will be ranked as "1" in the survey. As such, the lower the mean of the destination attribute, the more the participants considered before traveling. Conversely, the higher the scores, the less importance it has in participants' travel decision-making process. Gender is the independent variable in this section. The male and female's ranking of destination attributes results are listed in Table 6.

Table. 6 Ranking of Destination Attributes in Travel Destination Decision-Making Process

Female					Male				
Rank	**Attributes**	**N**	**Mean**	**Std.Dev.**	**Rank**	**Attributes**	**N**	**Mean**	**Std.Dev.**
1	price	322	4.69	3.25	1	price	56	4.41	2.90
2	nature	322	5.12	2.91	2	hospitality	56	5.13	2.29
3	climate	322	5.28	2.86	3	ease of access	56	5.21	2.90
4	accommodation	324	5.35	2.79	4	accommodation	56	5.38	2.69
5	hospitality	324	5.38	2.51	4	climate	56	5.38	3.14
6	access to the sea	324	5.45	3.05	6	leisure activities	56	5.41	2.88
7	cuisine	323	5.67	2.44	7	access to the sea	56	5.63	2.89
8	cultural	323	5.68	3.05	8	cuisine	56	5.78	2.61
9	leisure activities	323	5.79	3.06	9	cultural	56	5.86	3.24
10	ease of access	321	5.89	2.58	10	nature	56	6.57	2.90

For female students, price (mean = 4.69, SD = 3.25) is the top issue to consider, followed by nature (mean = 5.12, SD = 2.91), and climate (mean = 5.67, SD = 2.86). Among male participants, climate (mean = 5.38, SD = 3.14) and accommodations (mean = 5.38, SD = 2.69) tie for fourth place. The top three destination attributes of male participants are price (mean = 4.41), hospitality (mean=5.13, SD=2.29), and ease of access (mean = 5.2, SD = 2.89).

The following section in the survey tests climate change knowledge and perception in order to answer research questions 2 and 3. This part contains nine questions, and each question, as shown in Chapter III, is analyzed separately. Moreover, as each question evaluates different constitutions of climate change knowledge and perceptions, multiple items are under each question to test the question properly. In the analysis process, the mean of each question comes from the average mean of all items under that question. The relationship between gender and class level difference will be tested in the "Two-way

ANOVA Analysis" part later. In the following part, only the descriptive results of each question in the survey will be explained.

In Table 7, the results show students' knowledge about the causes of climate change. This question contains two items. The response scale ranges from 0 (don't know) to 4 (definitely true), which will correspond with the following sentiments: "Don't know" "Definitely false," "Probably false," "Probably true," and "Definitely true." For all the male students, the mean score was 2.75 (SD = 0.72), and for female students, the mean score was 2.83 (SD = 0.76). Although female students' scores were higher than males', the results show the participants' uncertainty about climate change causes.

Table 7. Statement 1: The Cause of Climate Change

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 1: The cause of climate change (includes items: 1. Climate change is an inevitable natural process of earth; 2. Climate change is caused by the human activities, due to the anthropogenic Greenhouse Gas emission.)	Male	Freshman	2.39	1.05	9
		Sophomore	3.09	0.71	17
		Junior	2.73	0.62	15
		Senior	2.60	0.43	15
		Total	**2.75**	**0.72**	**56**
	Female	Freshman	2.75	0.88	46
		Sophomore	2.79	0.67	100
		Junior	2.85	0.65	95
		Senior	2.88	0.90	84
		Total	**2.83**	**0.76**	**325**
	Total	Freshman	2.69	0.91	55
		Sophomore	2.83	0.69	117
		Junior	2.84	0.64	110
		Senior	2.84	0.85	99
		Total	**2.81**	**0.76**	**381**

Note. Mean value scale: 0 ="Don't know," 1 = "Definitely false," 2 = "Probably false," 3 = "Probably true," and 4 = "Definitely true."

In Table. 8, the "Issues effect globe temperature" statement, six items were designed to evaluate participants' knowledge about the issues that effects globe temperature. In general, all the participants tended to agree that these six issues probably influence the global temperature (mean = 2.86, SD = 0.73). Both female (mean = 2.88, SD = 0.71) and male (mean = 2.73, SD = 0.85) students' scores are under 3, which means the students are not strongly confident about their knowledge toward these issues.

Table 8. Statement 2: Issues Effect Globe Temperature

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 2: Issues affect globe temperature (includes items: Volcanic eruptions; Dust in the atmosphere; Clouds; Carbon dioxide; Greenhouse gases; Methane)	Male	Freshman	2.52	0.84	9
		Sophomore	2.87	0.96	17
		Junior	2.86	0.54	15
		Senior	2.58	0.99	15
		Total	**2.73**	**0.85**	**56**
	Female	Freshman	2.85	0.73	46
		Sophomore	2.92	0.69	100
		Junior	2.91	0.66	95
		Senior	2.83	0.78	84
		Total	**2.88**	**0.71**	**325**
	Total	Freshman	2.79	0.75	55
		Sophomore	2.91	0.73	117
		Junior	2.90	0.65	110
		Senior	2.79	0.81	99
		Total	**2.86**	**0.73**	**381**

Note. Mean value scale: 0 ="Don't know," 1 = "Definitely false," 2 = "Probably false," 3 = "Probably true," and 4 = "Definitely true."

In Table 9, the results show students' understanding of factors that contributed to global warming. In this case, all the participants seemed to have more certainty about global warming factors than the previous two questions. One special item has a reverse assessment criteria, which is called the "Reverse item" in total, there are seven "Reverse

items" in this survey, which will be analyzed later in Table 14. The "Reverse items" were distributed in different parts of the survey. As mentioned in Chapter III, the "Reverse" items represent the misunderstanding about climate change. Given this fact, the higher the score, the less understanding one has of particular climate change knowledge. Thus, the following analysis of questions "issues contribute to global warming", "greenhouse gasses constitution" and "climate change misunderstanding" exclude the data of these seven "Reverse items". When referring back to statement 3, both female (mean = 3.37, SD = 0.69) and male (mean = 3.38, SD = 0.76) participants' responses are over 3 (Probably true). The total mean score is 3.37 (SD = 0.69). It would appear that participants strongly believe that the items in this question contribute to global warming.

Table 9. Statement 3: Factors Contribute to Global Warming

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 3: Factors contribute to global warming (includes items: Automobiles/trucks; Deforestation; Burning fossil fuel for electricity; Chlorofluorocarbons)	Male	Freshman	3.07	1.06	9
		Sophomore	3.21	0.89	17
		Junior	3.71	0.50	15
		Senior	3.43	0.49	15
		Total	**3.38**	**0.76**	**56**
	Female	Freshman	3.41	0.54	46
		Sophomore	3.38	0.69	100
		Junior	3.41	0.71	95
		Senior	3.27	0.73	84
		Total	**3.37**	**0.69**	**325**
	Total	Freshman	3.35	0.65	55
		Sophomore	3.36	0.72	117
		Junior	3.45	0.69	110
		Senior	3.29	0.70	99
		Total	**3.37**	**0.70**	**381**

Note. Mean value scale: 0 ="Don't know," 1 = "Definitely false," 2 = "Probably false," 3 = "Probably true," and 4 = "Definitely true."

In the statement about "greenhouse gases constitution", participants were asked to see if they knew about the constitution of greenhouse gases. There are three items in this question: carbon dioxide, methane, and hydrogen. The third item is the Reverse item. As mentioned before, the result of this item will be analyzed in Table. 14. In Table 10, the results show that female participants (mean = 2.94, SD = 1.19) had a higher score than male students (mean = 2.8, SD = 1.4), however, both scores are under 3, which means most of the female and male students do not think carbon dioxide and methane constitute greenhouse gases. Contrasting these scores are those of junior male students, who scored, 3.22 (SD = 1.03), the highest among all the participants.

Table 10. Statement 4: The Constitution of Greenhouse Gases

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 4: Greenhouse gasses constitution (includes items: Carbon dioxide; Methane)	Male	Freshman	2.33	1.64	9
		Sophomore	2.76	1.44	17
		Junior	3.23	1.03	15
		Senior	2.70	1.54	15
		Total	**2.80**	**1.40**	**56**
	Female	Freshman	2.89	1.36	46
		Sophomore	2.99	1.18	99
		Junior	2.95	1.09	95
		Senior	2.88	1.24	84
		Total	**2.94**	**1.19**	**324**
	Total	Freshman	2.80	1.41	55
		Sophomore	2.96	1.21	116
		Junior	2.99	1.08	110
		Senior	2.85	1.28	99
		Total	**2.92**	**1.22**	**380**

Note. Mean value scale: 0 ="Don't know," 1 = "Definitely false," 2 = "Probably false," 3 = "Probably true," and 4 = "Definitely true."

In Table 11, the results represent participants' assessment of climate change impacts, and a total of sixteen impacts are included in this question. The total mean score of participants is 3.11 (SD = 0.69). Thus, in general, it can be surmised that survey participants think that climate change has a likely impact on the environment and society, such as "food production", "sea-level rise", "economic impacts", etc. Moreover, in this part, female students (mean = 3.14, SD = 0.68) reported a higher average score than male students (mean = 2.97, SD = 0.76). This is particularly true among the male freshman and sophomore students, when considering their response to the question about "travel impacts on climate change", which was in regard to the understanding of travel impacts on climate change.

Table 11. Statement 5: Climate Change Impacts

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 5: Impacts of climate change (includes items: Food production; Changes in animal migration; Changes in ecosystem; More UV radiation; An increase in the ozone hole size; Death of the coral reef; Sea-level rise; Glacial melt; Arctic ice melt; Increases in heavy precipitation; Hot weather; Decrease in frost days; Declining snowpack; More intense droughts; Increase in wildfires; Economic impacts)	Male	Freshman	2.70	0.79	9
		Sophomore	2.72	0.94	17
		Junior	3.28	0.59	15
		Senior	3.12	0.55	15
		Total	**2.97**	**0.76**	**56**
	Female	Freshman	3.10	0.78	46
		Sophomore	3.12	0.65	99
		Junior	3.19	0.71	95
		Senior	3.10	0.63	84
		Total	**3.14**	**0.68**	**324**
	Total	Freshman	3.04	0.79	55
		Sophomore	3.06	0.71	116
		Junior	3.21	0.69	110
		Senior	3.11	0.62	99
		Total	**3.11**	**0.69**	**380**

Note. Mean value scale: 0 ="Don't know," 1 = "Definitely false," 2 = "Probably false," 3 = "Probably true," and 4 = "Definitely true."

In Table 12, the data pertain to the understanding of travel impacts on climate change. In this part, female students (mean = 3.13, SD = 0.75) continuously scored higher than male students (mean = 2.86, SD = 0.96). The mean score of all the participants (mean = 3.09, SD = 0.79), indicated that most of the participants believed that travel, such as transportation and accommodations during travel, might have an impact on climate change. In male samples, except the seniors, the other three university educational level participants scored under 3, which means these students think travel might impacts global climate change.

Table 12. Statement 6: Travel Impacts on Climate Change

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 6: Travel impacts on climate change (includes items: Car transport; Cruise ships; Flying to the destination/Air travel; Accommodation)	Male	Freshman	2.83	1.11	9
		Sophomore	2.62	1.00	17
		Junior	2.77	1.12	15
		Senior	3.25	0.52	15
		Total	**2.86**	**0.96**	**56**
	Female	Freshman	3.30	0.59	46
		Sophomore	3.19	0.76	100
		Junior	3.14	0.68	95
		Senior	2.96	0.85	84
		Total	**3.13**	**0.75**	**325**
	Total	Freshman	3.23	0.71	55
		Sophomore	3.11	0.82	117
		Junior	3.09	0.76	110
		Senior	3.00	0.81	99
		Total	**3.09**	**0.79**	**381**

Note. Mean value scale: 0 =“Don’t know,” 1 = “Definitely false,” 2 = “Probably false,” 3 = “Probably true,” and 4 = “Definitely true.”

In the “climate change misunderstanding” statement, as aforementioned, five out of seven items are Reverse items. These items’ results are displayed in the Table.14. The

main purpose of this section is to evaluate the misunderstanding of climate change knowledge. The overall average score is 2.97 (SD = 0.87). In this part, male students scored higher than female ones, 3.01(SD=0.9) to 2.96(SD = 0.86). Furthermore, the younger male students have the highest scores among all participants (Freshman: mean = 3.22, SD = 0.67; Sophomore: mean = 3.29, SD = 0.99). The results in Table 13 show that students tend to exhibit an understanding of the difference between weather versus climate.

Table 13. Statement 7: Misunderstanding of Climate Change

Dimension	Gender	Class Level	Mean	Std. Dev.	N
Statement 7: Climate change misunderstanding (includes items: Climate is the average weather measured over long periods of time; Climate is the average weather measured over long periods of time.)	Male	Freshman	3.22	0.67	9
		Sophomore	3.29	0.99	17
		Junior	2.73	0.90	15
		Senior	2.83	0.88	15
		Total	**3.01**	**0.90**	**56**
	Female	Freshman	2.87	0.78	46
		Sophomore	3.01	0.83	99
		Junior	2.95	0.95	95
		Senior	2.98	0.85	84
		Total	**2.96**	**0.86**	**324**
	Total	Freshman	2.93	0.77	55
		Sophomore	3.05	0.86	116
		Junior	2.92	0.94	110
		Senior	2.96	0.85	99
		Total	**2.97**	**0.87**	**380**

Note. Mean value scale: 0 =“Don’t know,” 1 = “Definitely false,” 2 = “Probably false,” 3 = “Probably true,” and 4 = “Definitely true.”

Table. 14 illustrates the Reverse items’ results from the participants. From the scores below, the participants seem to have the ability to identify the difference between weather and climate, as well as current climate change issues, however, if one calculates the

means separately, there is one situation that needs to be pointed out. In Question 3, the item named "the hole in the ozone layer" has an average mean of 3.36 (SD = 1.05). Male students' mean score is 3.38 (SD = 1.1), compared with female's students mean score 3.35 (SD = 1.05). For example, this result demonstrates that most of the participants believe that the hole in the ozone layer is responsible for global warming.

Table 14. Reverse Items: Misunderstanding of Climate Change

Dimension	Gender	Class Level	Mean	Std. Dev.	N
R item: Climate change misunderstanding (includes items: The hole in the ozone layer; Hydrogen; Climate and weather are the same thing; Climate changes from year to year; The Earth's climate has been the same for thousands of years; Climate is the average weather measured over long periods of time; The earth is cooling, not warming; Global warming is more beneficial than harmful.)	Male	Freshman	1.86	0.44	9
		Sophomore	1.56	0.55	17
		Junior	1.96	0.28	15
		Senior	1.92	0.58	15
		Total	**1.81**	**0.50**	**56**
	Female	Freshman	1.92	0.59	46
		Sophomore	1.84	0.46	99
		Junior	1.84	0.42	95
		Senior	1.90	0.41	84
		Total	**1.87**	**0.46**	**324**
	Total	Freshman	1.91	0.56	55
		Sophomore	1.80	0.49	116
		Junior	1.86	0.40	110
		Senior	1.91	0.44	99
		Total	**1.86**	**0.46**	**380**

Note. Mean value scale: 0 = "Don't know," 1 = "Definitely false," 2 = "Probably false," 3 = "Probably true," and 4 = "Definitely true."

In Table 15, the results represent students' perceptions of climate change issues. In this case, the total mean score is 2.28 (SD = 0.51), which means most of the students did not agree with the attitudes or opinions in this question. And the scores of both male (mean = 2.21, SD = 0.6) and female (mean = 2.29, SD = 0.49) students are close. In order to better understand this question, each item was analyzed separately. For item "Global

warming is a very important issue for me," male freshmen (mean = 2.11, SD = 1.54) tended to disagree with this statement. Other students, both male and female tended to have higher scores in this item when their university educational levels rise. In spite of this, the total scores of males (mean = 2.6, SD = 1.22) and females (mean = 2.8, SD = 1.06) showed that most of the students did not think climate change is an important issue in their lives. In the second item, both female (mean = 2.39, SD = 0.92) and male (mean = 2.3, SD = 1.01) students agreed that they are not well informed about climate change, and the lower the class level, the lower the score. Interestingly though, both males (mean = 1.95, SD = 1.02) and females (mean = 1.83, SD = 1.02) think climate change is an urgent problem, which seems to contradict the data from the first item. In the fourth and fifth items, however, male students' scores are lower than those of the female students, with both disagree with the contents about climate change status quo and prevention in these two items. Moreover, in the sixth item, the results illustrated that both female and male participants do not think that the media exaggerates its representation of the issue of global warming. In the seventh item, both male (mean = 2.64, SD = 1.49) and female (mean = 2.88, SD = 1.17) participants tend to confuse the notion of "solid evidence" existing to prove that "human-induced climate change is occurring." Results from the final item, (which asks if the government should establish programs to respond to climate change), indicate that both male and female students agree that the government should be responsible for climate change mitigation. Furthermore, in this item, males (mean = 3.21, SD = 1.09) tend to have higher scores than females (mean = 3.12, SD = 1.03).

Table 15. Statement 8: Perceptions of Climate Change

		Male			Female			Total		
Items	**Class Level**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**	**Mean**	**SD**	**N**
Global warming is a very important issue for me.	Freshman	2.11	1.54	9	2.61	1.36	46	2.53	1.39	55
	Sophomore	2.71	1.05	17	2.86	0.98	99	2.84	0.99	116
	Junior	2.73	1.03	15	2.82	0.99	95	2.81	0.99	110
	Senior	2.67	1.40	15	2.81	1.04	84	2.79	1.09	99
	Total	2.61	1.22	56	2.80	1.06	324	2.77	1.08	380
I am well informed about the problem of climate change.	Freshman	2.00	1.32	9	2.28	0.93	46	2.24	1.00	55
	Sophomore	2.35	1.06	17	2.40	0.86	99	2.40	0.88	116
	Junior	2.40	0.91	15	2.37	1.02	95	2.37	1.00	110
	Senior	2.33	0.90	15	2.44	0.87	84	2.42	0.87	99
	Total	2.30	1.01	56	2.39	0.92	324	2.37	0.93	380
Climate change is not as urgent as other problems (e.g. poverty)	Freshman	2.22	1.20	9	1.70	0.89	46	1.78	0.96	55
	Sophomore	1.82	0.95	17	1.82	1.04	99	1.82	1.03	116
	Junior	1.73	0.88	15	1.73	1.02	95	1.73	0.99	110
	Senior	2.13	1.13	15	2.05	1.04	84	2.06	1.05	99
	Total	1.95	1.02	56	1.83	1.02	324	1.85	1.02	380
Probably the effects of climate change will only become visible in dozens of years.	Freshman	1.56	1.13	9	1.93	0.95	46	1.87	0.98	55
	Sophomore	1.41	1.06	17	1.89	1.00	99	1.82	1.02	116
	Junior	1.47	1.13	15	1.80	1.01	95	1.75	1.02	110
	Senior	2.53	1.06	15	1.90	0.89	84	2.00	0.94	99
	Total	1.75	1.16	56	1.87	0.96	324	1.86	0.99	380
It is already too late to prevent climate change.	Freshman	1.33	0.71	9	1.61	0.77	46	1.56	0.76	55
	Sophomore	1.71	1.10	17	1.80	0.87	99	1.78	0.90	116
	Junior	1.53	1.13	15	1.62	0.90	95	1.61	0.93	110
	Senior	1.40	1.06	15	1.83	0.82	84	1.77	0.87	99
	Total	1.52	1.03	56	1.73	0.85	324	1.70	0.88	380
Media coverage is exaggerated about global warming.	Freshman	1.33	1.32	9	1.78	0.94	46	1.71	1.01	55
	Sophomore	1.82	1.42	17	1.57	1.00	99	1.60	1.07	116
	Junior	1.47	0.99	15	1.61	0.98	95	1.59	0.98	110
	Senior	1.80	1.01	15	1.74	1.03	84	1.75	1.02	99
	Total	1.64	1.18	56	1.65	0.99	324	1.65	1.02	380
There is solid evidence that human-induced climate change is occurring.	Freshman	1.67	1.80	9	2.70	1.19	46	2.53	1.35	55
	Sophomore	2.12	1.65	17	2.96	1.01	99	2.84	1.16	116
	Junior	3.20	1.01	15	2.98	1.20	95	3.01	1.18	110
	Senior	3.27	1.03	15	2.77	1.30	84	2.85	1.27	99
	Total	2.64	1.49	56	2.88	1.17	324	2.84	1.23	380
Government should established programs to response to climate change.	Freshman	3.00	1.22	9	2.83	1.23	46	2.85	1.22	55
	Sophomore	2.76	1.30	17	3.21	0.98	99	3.15	1.04	116
	Junior	3.40	1.06	15	3.18	1.01	95	3.21	1.01	110
	Senior	3.67	0.49	15	3.12	0.97	84	3.20	0.94	99
	Total	3.21	1.09	56	3.12	1.03	324	3.14	1.04	380

Note. Mean value scale: 0 =“Don’t know,” 1 = “Strongly disagree,” 2 = “Disagree,” 3 = “Agree,” and 4 = “Strongly agree.” SD = Standard Deviation.

The section relating to “resource for climate change knowledge” focuses on the ways in which students derive information regarding climate change. The top five information resources of female students are the internet (mean = 3.29, SD = 0.85), television (mean

= 2.74, SD = 1.01), university educational level (mean = 2.7, SD = 1.00), environmental groups (mean = 2.69, SD = 1.10), and family/friends (mean = 2.65, SD = 0.83). The results indicate that both the female and male student samples, cite the internet (mean = 3.28, SD = 0.85) as their top resource for information regarding climate change. Otherwise, the data reveal diverging responses between male and female students. The top five resources of male students are Internet (mean = .21, SD = 0.87), class of university (mean = 2.82, SD = 0.94), environmental groups (mean=2.68, SD=1.08), television (mean = 2.63, SD = 0.91), and scientists (mean = 2.43, SD = 1.19). Radio seems to step down from the stage of history. Both female (mean = 1.68, SD=0.85) and male (mean = 1.55, SD = 0.87) students obtain the least information from it.

Table 16. Statement 9: Resource for Climate Change Knowledge

	All				Female				Male			
Items	**Rank**	**Mean**	**N**	**Std. Dev.**	**Rank**	**Mean**	**N**	**Std. Dev.**	**Rank**	**Mean**	**N**	**Std. Dev.**
Television	2	2.72	379	0.84	2	2.74	323	0.83	4	2.63	56	0.91
Radio	15	1.66	379	0.85	15	1.68	323	0.85	15	1.55	56	0.87
Internet	1	3.28	379	0.85	1	3.29	323	0.85	1	3.21	56	0.87
Books	11	2.04	379	1.04	11	2.03	323	1.04	10	2.09	56	1.01
Magazines	14	1.94	379	0.99	13	1.94	323	0.98	14	1.91	56	1.07
Newspaper	8	2.17	379	1.00	8	2.15	323	1.01	7	2.27	56	0.92
Family/Friends	5	2.62	379	0.93	5	2.65	323	0.91	6	2.41	56	0.99
Movies	10	2.07	379	0.95	9	2.09	323	0.96	12	2.00	56	0.87
Museums, zoos, aquariums	7	2.19	379	1.02	7	2.20	323	1.03	8	2.16	56	0.97
Government agencies	13	1.95	379	0.96	13	1.94	323	0.96	13	1.98	56	0.94
Governmental offices, such as NASA	12	1.99	379	0.97	12	1.98	323	0.99	11	2.02	56	0.88
Environmental groups	4	2.69	379	1.09	4	2.69	323	1.10	3	2.68	56	1.08
Class of university	2	2.72	379	1.00	3	2.70	323	1.01	2	2.82	56	0.94
Scientists	6	2.31	379	1.10	6	2.29	323	1.08	5	2.43	56	1.19
Public hearing/Events/Lectures	9	2.08	379	1.02	10	2.08	323	1.03	9	2.11	56	0.98

Note. Mean value scale: 1 = “Not at all,” 2 = “A little,” 3 = “Some,” and 4 = “A lot.”

The final section of the survey addresses the factors that influence students considering climate change issues in their travel. Table 17 shows the data from each item in this section. For the first factor, both female (mean = 1.96, SD = 0.82) and male (mean = 1.88, SD = 0.85) students responded similarly. The data show that participants do not consider climate change issues when they make travel destination decisions. In the second (mean = 1.97, SD = 0.84) and third (mean = 1.93, SD = 0.92) items, however, most female and male students do agree that they can do something to change their travel behavior to help climate change mitigation. In the fourth item (which enquires if flying is the only option to travel large distances), female (mean = 2.46, SD = 1.14) and male

(mean = 2.48, SD = 2.37) participants' scores are close to each other. Their answers highlight the possibility that some undergraduate students, use other transportation options for long-distance travelling. And, for the fifth item: cost, the results illustrate that both female (mean = 3.08, SD = 0.97) and male (mean = 3.09, SD = .98) participants agree that cost plays a more vital role in their travel decision-making than climate change issues. Furthermore, the sixth and seventh items relate to the personal GHG consumptions in travel. The data reveal that students (mean = 2.08, SD = 1.20) do not think reducing their personal GHG consumption in travel is important. Furthermore, they do not consider the growing consumption (mean = 1.88, SD = 1.49) in travel to be the most important barrier for sustainable development.

As seen in the Table 17, both female and male students do not consider climate change impacts in their travel destination decision-making process. From the results found in the fifth item, it appears that cost is a factor that impede students considering climate change issues in their travel plans. Furthermore, considering the results of the sixth item, students' perceptions of their personal roles in climate change mitigation might also be a factor. Another important note regarding this section is that, participants were asked to write down any issues that they think are not mentioned in the survey. Of the 381 participants, only seven students responded to this question. Their answers were the following: "Awareness," "Pollution from factories," "Media is exaggerated in DENYING climate change, and we are dramatically speeding up whatever change is happening now," "Agriculture industry is responsible for more deforestation, greenhouse gasses, and health problems than all of the transportation industries combined,",

"recycling," "Am now interested in knowing which method(s) of travel are more environmentally friendly?," and "Factories using wood may cause deforestation?".

Table 17. Issues in Changing Travel Behavior toward Climate Change

Items	Class Level	Mean	SD	N	Mean	SD	N	Mean	SD	N
I consider climate change issues in my travel destintion decision making.	Freshman	1.78	0.97	9	1.93	0.85	46	1.91	0.87	55
	Sophomore	1.88	0.93	17	2.02	0.77	98	2.00	0.79	115
	Junior	1.67	0.62	15	1.86	0.75	95	1.84	0.74	110
	Senior	2.13	0.92	15	2.01	0.91	84	2.03	0.91	99
	[illegible]	1.88	0.85	56	1.96	0.82	323	1.95	0.82	379
My contribution has as much impact as a drop in the ocean. There is not much I can do.	Freshman	1.89	1.36	9	2.11	0.64	46	2.07	0.79	55
	Sophomore	2.12	1.11	17	1.92	0.70	98	1.95	0.77	115
	Junior	2.07	0.96	15	1.86	0.81	95	1.89	0.83	110
	Senior	2.13	0.64	15	2.00	0.98	84	2.02	0.94	99
	Total	2.07	0.99	56	1.95	0.81	323	1.97	0.84	379
I can do little to change my travel behavior.	Freshman	2.11	1.17	9	1.87	0.96	46	1.91	0.99	55
	Sophomore	1.47	1.01	17	1.98	0.88	98	1.90	0.92	115
	Junior	2.33	0.82	15	1.81	0.88	95	1.88	0.89	110
	Senior	2.47	0.74	15	1.93	0.95	84	2.01	0.94	99
	Total	2.07	0.99	56	1.90	0.91	323	1.93	0.92	379
Flying is the only option to cover large distanes in my travel.	Freshman	2.22	1.48	9	2.59	0.78	46	2.53	0.92	55
	Sophomore	2.88	1.17	17	2.80	4.01	98	2.81	3.72	115
	Junior	2.00	1.07	15	2.18	1.11	95	2.15	1.10	110
	Senior	2.60	0.83	15	2.39	1.02	84	2.42	0.99	99
	Total	2.46	1.14	56	2.48	2.37	323	2.48	2.23	379
Cost plays an important role in my travel destination decision making process rather than climte change.	Freshman	3.22	1.30	9	3.20	0.65	46	3.20	0.78	55
	Sophomore	3.18	1.01	17	2.99	1.04	98	3.02	1.03	115
	Junior	3.13	0.64	15	3.17	0.96	95	3.16	0.92	110
	Senior	2.87	1.06	15	3.04	1.02	84	3.01	1.03	99
	Total	3.09	0.98	56	3.08	0.97	323	3.08	0.97	379
I find it important to reduce my GHG consumption that occurs during in my travel.	Freshman	3.22	1.30	9	1.98	1.31	46	1.93	1.29	55
	Sophomore	3.18	1.01	17	2.12	1.23	98	2.03	1.23	115
	Junior	3.13	0.64	15	2.13	1.17	95	2.15	1.14	110
	Senior	2.87	1.06	15	2.08	1.19	84	2.13	1.17	99
	[illegible]	3.09	0.98	56	2.09	1.21	323	2.08	1.20	379
The continuous growth in consumption is the most important barrier for sustainable development.	Freshman	2.33	1.32	9	2.09	1.53	46	2.13	1.49	55
	Sophomore	1.29	1.40	17	1.73	1.48	98	1.67	1.47	115
	Junior	2.27	1.62	15	1.75	1.47	95	1.82	1.50	110
	Senior	1.67	1.45	15	2.11	1.49	84	2.04	1.48	99
	Total	1.82	1.49	56	1.89	1.49	323	1.88	1.49	379

Note. Mean value scale: 0 ="Don't know," 1 = "Strongly disagree," 2 = "Disagree," 3 = "Agree," and 4 = "Strongly agree."

Two-way ANOVA Analysis Result

A two-way ANOVA is applied to evaluate the influence of gender and university educational levels on participants' climate change knowledge and perceptions. Thus, gender and university educational levels are the independent variables for the analysis. And the two-way ANOVA will not only test their influence on the dependent variables, but also the interaction between the two independent variables. The dependent variables in the two-way ANOVA test are the means of each statement. The means of each statement which represent participants' level of knowledge and perceptions on climate change. All the statistical analysis will be done by SPSS 24. Before statistical analysis, two independent variables, in the format of categorical variables, were transformed into continuous variables. Gender was transformed into the dummy variable (Male =1, Female = 2) and the university educational level variable was recoded to an ordinal variable, with 1 = Freshman, 2 = Sophomore, 3=Junior, 4 = Senior.

According to the results in Table 18, in general, most of the knowledge and perception sections are not influenced by gender or university educational level, with the exception of "travel impacts on climate change" (knowledge part), "impacts of climate change" (knowledge part), "climate change misunderstanding" (Reverse items, knowledge part), and "perceptions of climate change" (perception part). In "travel impacts on climate change" part ($F(1, 373) = 5.9$, $p < .05$), gender has an impact on the level of knowledge, but university educational level does not. Responding to Table 12, female students have a higher score than male students. Regarding the two-way ANOVA analysis results of "impacts of climate change"($F(3, 372) = 2.57$, $p = .05$), "misunderstanding(Reverse items)" ($F(3, 372) = 2.67$, $p < .05$), and "climate change

perceptions" ($F(3, 372) = 3.43$, $p < .05$), university educational level does impact college students' climate change knowledge and perceptions to some extent.

Table 18. Two-way ANOVA Test-Comparison of Gender and Class-Level influence on Knowledge and Perceptions on Climate Change

Dimension		SS	df	MS	F	Sig.
Statement 1:	Gender	0.60	1	0.60	1.05	0.31
The cause of climate change	Class Level	2.88	3	0.96	1.69	0.17
	Gender * Class Level	3.21	3	1.07	1.88	0.13
	Error	212.25	373	0.57		
	Total	3235.75	381			
Statement 2:	Gender	1.28	1	1.28	2.38	0.12
Issues affect globe temperature	Class Level	1.77	3	0.59	1.09	0.35
	Gender * Class Level	0.65	3	0.22	0.40	0.75
	Error	201.37	373	0.54		
	Total	3320.19	381			
Statement 3:	Gender	0.01	1	0.01	0.02	0.88
Issues contribute to global warming	Class Level	2.75	3	0.92	1.89	0.13
	Gender * Class Level	2.70	3	0.90	1.86	0.14
	Error	180.81	373	0.48		
	Total	4507.70	381			
Statement 4:	Gender	1.31	1	1.31	0.87	0.35
Greenhouse gasses constitution	Class Level	4.84	3	1.61	1.07	0.36
	Gender * Class Level	3.80	3	1.27	0.84	0.47
	Error	561.14	372	1.51		
	Total	3801.25	380			
Statement 5:	Gender	1.38	1	1.38	2.91	0.09
Impacts of climate change	Class Level	3.66	3	1.22	2.57	**0.05**
	Gender * Class Level	2.47	3	0.82	1.73	0.16
	Error	176.59	372	0.47		
	Total	3862.46	380			
Statement 6:	Gender	3.50	1	3.50	5.85	**0.02**
Travel impacts on climate change	Class Level	1.33	3	0.44	0.74	0.53
	Gender * Class Level	5.82	3	1.94	3.24	**0.02**
	Error	223.32	373	0.60		
	Total	3873.63	381			
Statement 7:	Gender	0.21	1	0.21	0.28	0.60
Climate change misunderstanding	Class Level	3.12	3	1.04	1.37	0.25
	Gender * Class Level	2.89	3	0.96	1.27	0.28
	Error	281.52	372	0.76		
	Total	3640.00	380			
Statement 8:	Gender	0.41	1	0.41	1.57	0.21
Perceptions on climate change	Class Level	2.65	3	0.88	3.43	**0.02**
	Gender * Class Level	1.26	3	0.42	1.63	0.18
	Error	96.05	372	0.26		
	Total	2066.14	380			
Reverse Items:	Gender	0.13	1	0.13	0.60	0.44
Climate change misunderstanding	Class Level	1.71	3	0.57	2.67	**0.05**
	Gender * Class Level	1.24	3	0.41	1.93	0.12
	Error	79.38	372	0.21		
	Total	1398.11	380			

Note. SS = Sum of Squares, MS = Mean Square.

In order to understand which class-level has a better performance in the "impacts of climate change", "perceptions of climate change" and "climate change misunderstanding" (Reverse item), in Table 18, the mean differences are picked from these two questions' two-way ANOVA analysis results. From Table. 19, it was found that in statement 5: impacts of climate change, freshmen have a lower mean score than the other higher educational class level students depending on the negative means in the table. Similarly, in statement 8: perception of climate change, the freshmen also have a lower mean score than the other higher educational level students. For the Reverse Items, freshmen have a positive mean difference compared to the other three educational level students. Thus, the data reveal that seniors have a higher level of climate change knowledge than freshmen (for Reverse items, the smaller the score, the better).

Table 19. Mean Difference between Class-Level in Statement 8 and Reverse items

Dimension	Class Level		Mean Difference (I-J)
Statement 5: Impacts of climate change	Freshman	Sophomore	-0.027
		Junior	-0.170
		Senior	-0.071
Statement 8: Perceptions on climate change	Freshman	Sophomore	-0.146
		Junior	-0.126
		Senior	-0.220
Reverse Items: Climate change misunderstanding	Freshman	Sophomore	0.109
		Junior	0.050
		Senior	0.002

Summary

In summary, climate is regarded as an important factor that students consider before their travel decision-making. Generally speaking, the scores in the climate change knowledge and perception section reflect that the student participants' level of knowledge about climate change suggest an uncertainty in their knowledge about some climate change issues. It can be inferred that students know about the impacts of climate change, travel's impact on climate change, and the factors that contribute to global warming better, because of the relatively higher scores in these sections. Although, in most of the cases, female students received higher scores than male students, the results of statistical analysis conclude, however, that in general, gender creates no significant differences of impacts on climate change knowledge and perceptions. University education level does have an impact on students' perceptions of climate change ($p = 0.017$). For example, senior students receive a higher score than freshmen in the perception section. In the final section, which tests the issues that influence students considering climate change in their travel, cost seems to be the top issue. And students' lack of awareness and perceptions of their own roles in reducing energy consumption in travel is another obvious factor in the collection of analyzed data.

CHAPTER V

DISSCUSSION AND CONCLUSION

This chapter summarizes and discusses the results of the data analysis, and potential research and practical implications. Finally, the limitations of this study and corresponding recommendations for future research are included.

Discussion

This study examined whether college students regard climate as an important destination attribute when they make travel destination decisions. Also, this study explored whether gender and university educational level influence college students' level of knowledge and perceptions toward climate change issues. In addition, the issues that influence students' consideration of climate change in their travel decision-making process were examined. According to the data in this study, price is the dominant factor in student's travel decision-making process. Moreover, the lack of awareness of tourists' roles in climate change is another factor that influences students considering climate change in their travel decision-making. Gender seems to have little influence on college students' climate change knowledge and perceptions, except in the "Travel impacts on climate change" section ($F(1, 373) = 5.9$, $p < .05$). Additionally, university educational level influences one's knowledge of "impacts of climate change" ($F(3, 372) = 2.57$, $p<=.05$), "misunderstanding" ($F(3, 372) = 2.7$, $p < .05$) of climate change and climate change perceptions ($F(3, 372) = 3.4$, $p <.05$).

Research Question 1: "How important will students regard "climate" in their travel destination decision-making process?" was addressed by the data in Table 6. The data

show that both female and male students regard climate as a critical destination attribute in their travel destination decision-making process, though some of the ranks of these destination attributes are quite different between male and female students. For example, there are two destination attributes: “ease of access” and “nature” in this section, and the data reveal that female and male students have diverging opinions regarding these two attributes. Female students rank nature (mean = 5.12, SD = 2.91) as the second most important item in their travel destination decision-making process, whereas “ease of access” (mean = 5.89, SD = 2.58) ranks as the least important of attributes. Conversely, male students consider “ease of access” (mean = 5.21, SD = 2.90) to be the third most important attribute and “nature” (mean = 6.57, SD = 2.90) as the least important. While “hospitality” is ranked as the second (mean = 5.13, SD = 2.29) most important attribute in the male group, but the fourth highest (mean = 5.34, SD = 2.48) in the female group. “Accommodation” also ranks in the top five in both male and female groups. Based on these results, it could be assumed that male and female students have both consensus and divergence on destination attributes. Their preference of destination attributions could be traced back to their responses in the survey’s third section: issues that impede students when considering climate change in travel. Additionally, the attention they pay to travel cost might be the reason they had high scores in an attribute in the third section that states: “Cost plays an important role in my travel destination decision making process rather than climate change.” As female students value “nature” as one of their top three destination attributes in travel decision-making, this might explain why female students have relatively higher scores in the climate change knowledge and perception segments of this study.

The discussion of Research Question 2: “What is the general level of climate change knowledge among college students?” is based on the statements related to climate change knowledge as presented in their surveys (data from Table.6 to Table.14). In general, most students are unsure if climate change is an inevitable and natural process of the earth and if climate change is or is not induced by human activity. To some extent, it can be inferred that this lack of awareness may have influenced their performance in the subsequent sections. For example, both female and male participants exhibited limited knowledge of the constitution of greenhouse gases and climate/weather differences. The results of the questions “issues contribute to global warming”, “impacts of climate change”, and “travel impacts on climate change”, however, reveal that the participants have some understanding relative to global warming, climate change impacts and travel impacts on climate change. The average score of each of these three questions was 3 (“probably true”). The scores reveal that some of the students might not be very confident in their knowledge about these issues. When evaluating the misunderstanding of knowledge about climate change (Reverse items), the students (mean = 1.86, SD = 0.46) responded with relatively high scores. In spite of this, most of the students regard “the hole in the ozone layer” (mean = 3.36, S = 1.05) to be one of the factors that contributes to global warming; which is incorrect. But, in McNeal, et al., (2014), the 6-20 grade educators’ responses showed no misconceptions of this issue, which questions why students misunderstand the knowledge in this study but their “teachers” did not. Since there is no follow-up survey for this study, this question remains unanswered. This phenomenon should be explored in future studies.

As suggested in other studies, uncertainty about climate change in the general public is common (Downing & Ballantyne, 2007; Poortinga, Spence, Whitmarsh, Capstick, & Pidgeon, 2011). In Poortinga et al., (2011), one out of five participants who think the world's climate is changing still expressed some degree of uncertainty about whether or not it is "really happening", which is similar to the results of this study. Attitudinal uncertainty and skepticism about the existence, the anthropogenic nature of the changes, and impact of climate change seems to, in part, stem from doubts about the scientific consensus on climate change (Poortinga et al., 2011). This may be partly due to the media representation of climate change as controversial and uncertain, and the human causes of climate change not always self-evident (Antilla, 2005). Moreover, as uncertainties about different aspects of the climate debate are closely interlinked (Whitmarsh, Seyfang, & O'Neill, 2011), this might explain why, in this study, most students show uncertain attitudes about climate change knowledge.

The answer in Research Question 3 can be addressed according to the data in Table. 18. From previous studies (Barkan, 2004; Brody et al., 2008; Diekmann & Preisendorfer, 1998; Dietz, Stern & Guagnano, 1998; Zelezny, Chua, & Aldrich, 2000, Ewert & Baker, 2001), this study anticipated that female students are more sensitive to climate change issues, thus resulting in female students having a higher score than male students in the sections tracking knowledge and perceptions. In the results of climate change knowledge and perception section, female students, in most cases, have higher scores than male students. However, the two-way ANOVA analysis results show that gender has no influence on the level of climate change knowledge and perception, except in the knowledge section: "travel impacts on climate change". From the means, it was found

that female students (mean = 3.13, SD = 0.75) were more knowledgeable about the impacts of travel on climate change issues than male students (mean = 2.86, SD = 0.96). The low response rate of male students is a noticeable phenomenon in this study which may cause bias. It may have been possible that the male students who are more knowledgeable about climate change responded to the survey, and the male students who are less knowledgeable about climate change did not respond. And the low response rate of male students also implies that referring to climate change issues, male students might have less sensitivity than female students, or male students might have less willingness to pay attention to climate change issues.

Two differences relative to class-level were found in the two-way ANOVA analysis in the climate change perception, climate change impacts (knowledge) and misunderstanding-knowledge sections. Senior students, both female and male, in most cases, perform better than students of lower university educational class levels.

In terms of university education level differences among the students, previous studies suggest that education helps to heighten environmental concerns and awareness as it can increase an individual's ability to appreciate complex and integrative large scale problems (Hines, Hungerford, & Tomera, 1987; Milbrath, 1989), with school' being one of the most important sources of environmental information (Chan, 1996). The data in this study support the belief that "class of university" is an important climate change information resource for both females (mean = 2.70, SD = 1.01) and males (mean = 2.82, SD = 0.94). Second, in the climate change knowledge part, the educational class level influenced the level of knowledge on the impacts of climate change, and the misunderstanding of climate change (Reverse items). In the climate change impacts

section, senior students have higher scores than students in lower educational class level. In the misunderstanding of climate change section, senior students, in most items, have lower scores than students in lower university educational class levels, especially in comparison to freshmen. These results support the idea that education helps to enhance the understanding of climate change knowledge, since in the "misunderstanding of climate change" section, the lower the score, the better. Most of the participants, however, are from tourism/outdoor recreation/environment related majors (51.18%), and thus may present a potential confounding variable. In those participants' classes, climate change related issues might be mentioned or taught, and this explanation corresponds to the results of the previously mentioned "Climate change information resources."

Some of the responses in the perception section need to be further discussed. First, students' responses (mean = 2.77, SD = 1.08) to the first item "Global warming is a very important issue for me" shows that climate change is not regarded as an overly important issue for the participants. Nevertheless, they disagree with the following statement "climate change is not as urgent as other problems" (third item, mean = 1.85, SD = 1.02), "only become visible in dozens of years" (fourth item, mean = 1.86, SD = 0.99), and "It is already too late to prevent climate change" (fifth item, mean = 1.70, SD = 0.88). Moreover, in the last item, students (mean = 3.14, SD = 1.04) agreed that "The government should established programs to response to climate change". From those results, it could be concluded that there is a gap between "views/attitudes" and behaviors (Ewert & Galloway, 2009; Stoll-Kleemann, O'Riordan, & Jaeger, 2001) among college students, which is also a phenomenon among the general public in other studies (Becken, 2007; Cohen & Higham, 2011; Hares, Dickinson, & Wilkes, 2010; Higham, Cohen, &

Cavaliere, 2014; Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007). Thus, it is not surprising that college students in this study show similar patterns in their answers.

In terms of Research Question 4, the results of the "Issues in changing travel behavior toward climate change" were also analyzed by the two-way ANOVA. The data show that both female and male students do not strongly consider climate change issues in their travel (mean = 1.95, SD = 0.82), with price (mean = 3.08, SD = 0.97) being more important than climate change in their travel destination decision-making process. Moreover, these results for both female and male students were quite similar. In this section, an attitude-behavior gap was found. Items "My contribution is as a drop in the ocean. There is not much I can do.", "I can do little to change my travel behavior.", and "I find it important to reduce my GHG consumption in my travel" refer to students' willingness to change their behavior in travel in order to mitigate greenhouse gas emissions during travel. Students' responses on items "My contribution is as a drop in the ocean. There is not much I can do." and "I can do little to change my travel behavior." show that, in general, they do not agree on the point that they can do little to influence the sustainable development of travel toward climate change issues (mean = 1.97, SD = 0.84) and change their travel behavior (mean = 1.93, SD = 0.92). The analysis of the item "I find it important to reduce my greenhouse gas consumption in my travel", however, reveals that students (mean = 2.08, SD = 1.20) do not agree with this item. These results imply that even though students think they can do something pro-environmentally in reducing their consumption in travel, in actuality, they might not be able to do so.

This attitude-behavior discrepancy, found in this study, is also addressed in many previous pro-environmental behavior studies. Pro-environmental behavior means

behavior that consciously seeks to minimize the negative impact of one's actions on the natural and human-made worlds (e.g. minimize resource and energy consumption, use of non-toxic substances, reduction of waste products) (Kollmuss & Agyeman, 2002). The pro-environmental behavior may be associated with knowledge of the issues, knowledge of action strategies, a sense of responsibility, attitudes, and locus of control (Hines, Hungerford & Tomera, 1986). The causes of the discrepancy include: experience, social norms, cultural traditions, social pressures, and opportunities to choose different actions (Hines et al., 1987; Rajecki, 1982). For example, in tourism, travel choice is dependent on variables such as money, effort, and the perceived benefits of tourism (Hares et al., 2010). Thus, in tourism, climate change awareness appears to have little effect on tourism consumption (Anable, Lane, & Kelay, 2006; Dickinson, Robbins, & Fletcher, 2009; Eijgelaar, Thaper, & Peeters, 2010; Hares et al., 2010; McKercher, Prideaux, Cheung, & Law, 2010). Some contextual factors, such as lack of alternatives to air travel, and habitual travel choices, may influence people with pro-environmental concerns toward making unsustainable travel choices (Hares et al., 2010). In this study, most students' tended to disagree (mean = 2.48, SD = 2.23) with the item "Flying is the only option to cover large distances in travel". However, this answer does not mean college students rarely travel long-distances. Car transportation might be the alternative method to cover the long-distance travel among college students. But, car transportation also contributes to a large portion of greenhouse gas emissions in tourism (UNWTO-UNEP-WMO, 2008). Therefore, this might explain why students' attitudes toward reducing their consumption which influence climate change are positive, but the willingness to change their travel behavior is relatively low.

In conclusion, the climate change knowledge and perceptions in this study cannot be attributed to gender differences. Although gender does influence students' knowledge of travel impacts on climate change, females understanding more than males, no other gender influence was found in general climate change knowledge and perceptions. To some extent, university educational level has an impact on students' climate change perceptions, and misunderstanding of climate change knowledge. In these two sections, senior students received higher scores than students in lower class levels. Moreover, in the "resources of climate change knowledge" section, "class of university" is regarded, for both females and males, as a critical resource for climate change information.

Conclusion

Implications of the Study

In the research arena, tourists' perceptions of climate change are important to climate-sensitive destinations since these perceptions link to tourists' willingness to participate in sustainable development in tourism. There are differences among individuals in terms of personal beliefs, knowledge, values, experiences, social networks and demographic background which can lead to different perceptions of climate change and barriers to engagement (Lorenzoni et al., 2007). It can also lead to difficulties in measuring attitudes and behaviors, and the presence of external factors that influence behaviors (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975; Tarrant & Cordell, 1997; Tarrant & Green, 1999; Wall, 1995). It is important to study different groups of people in order to understand people's attitudes in general, which will, in turn, help policy makers gain support for climate change policies and programs. For example, in this study, the

main resources for climate change information were reported to come from the Internet (mean = 3.28, SD = 0.85), the television (mean = 2.72, SD = 0.84) and a university class (mean = 2.72, SD = 1.00). But, for other groups of people, such as the elderly, middle-aged, and non-college-educated people, their information resources may be different. Moreover, the perceptions of contemporary tourists may not be shared by future generations (Scott, Jones, & Konopek, 2007). Therefore, it is always crucial to be aware of the understandings of the general public's perceptions of climate change, and make subsequent arrangements for suitable plans addressing climate change.

Gender was treated as an important variable in this study, although no significant gender differences were found in the climate change knowledge and perceptions sections, except in the "Travel impacts on climate change" section, in this study. Future studies could focus on exploring more gender-related issues in climate change, such as in the climate change adaptation and pro-environmental behavior change fields, especially in rural areas and developing countries. As mentioned in the literature review, women tend to express more pro-environmental concerns than do men in general environmental issues, such as pro-environmental attitudes, and support for environmental protection (Bord and O'Connor 1997; Davidson and Freudenburg 1996). However, in most previous sociological-environment studies, the gender issue in climate change was limited and recurred on two themes: virtue and vulnerability (Arora-Jonsson, 2011; Dankelman, 2002; Denton, 2002; Terry, 2009). Moreover, in the climate change decision and policy-making field, women are often marginalized (Arora-Jonsson, 2011; Dankelman, 2002; Denton, 2002; Nelson, Meadows, Cannon, Morton, & Martin, 2002; Terry, 2009). It is important to have more gender-related studies in the climate change field in order to encourage

more women to participate in climate change mitigation and adaption activities. Not only are women more vulnerable than men when facing climate change impacts (e.g. extreme weather events, economy, health problems), but also women are the primary providers and users of energy, especially in the developing countries (Dankelman, 2002; IPCC, 2007; Terry, 2009).

Practically speaking, cost seems to be the top barrier for tourists to change their behaviors to support the climate change mitigation implementation in real life (Becken, 2007; Cohen & Higham, 2011; Hares, et al., 2010; Lorenzoni, et al., 2007). A possible explanation is that concerns about climate change and the environment are overshadowed by more immediate financial concerns in the current economic climate (Weber, 2010). Also, for people, values or attitudes, such as the need for personal comfort, the belief in technological solutions, the belief in personal contributions to influence climate change, the demand for a justifiable relationship between personal costs and social gains, and the acceptance that there is indeed a crisis, contribute to their behaviors toward the environment. (Wortmann, Stahlberg, & Frey, 1993). In this study, the student samples show similarities to the general public studied in previous studies. Students regard cost as the top issue to be considered during their travel decision-making process, followed by personal comfort and convenience (such as “accommodations” and “ease of access”). The study implies that if tourism destinations or the government want to promote their climate change policies or programs, it will be important to include price and convenience factors.

Limitations of the Study

Firstly, demographic variables (especially, age, education level, personal income, and cultural background), were limited due to the college student sample. In this study,

students' ages ranged from 18-32 years old (only one student was 32 years old, while the other students' ages ranged from 18-25). Compared to former climate change studies, which regarded age as a variable, the results of this study could only represent the young adult population. According to previous studies, age does have some impacts on public attitudes toward climate change, such as that older people are more likely to be skeptical (Upham et al., 2009; Whitmarsh, 2011), and there is substantial skepticism on the notion of anthropogenic climate change in younger ages, among 11–17 year old groups (COI, 2008). Moreover, the influences of high levels of education on climate change knowledge and perceptions also could not be tested in this study, as all the participants were undergraduate students. No higher-educated groups (graduate students) were included in this study. Furthermore, in this study, most of the students were from the School of Public Health, and most of the majors were related to pro-environmental studies, such as: "Environmental and Sustainability Studies", " Outdoor Recreation", and " Tourism, Hospitality and Events Management". Thus, participants' education background may have influenced the final results in this study. Also, there was homogeneity of ethnic and sociocultural background in the composition of the survey demographic as well: 95.28% of participants are from the United States, and among them, 51.18% are Caucasian while 38.58% of all the participants did not provide their ethnicity. 262 participants are from Indiana. Thus, the cultural background of this study was not very diverse. Future studies could include a diverse background sample population to weaken the homogeneity influence on the result.

Second, a gender disparity exits in this sample. Among the 381 participants, only 56 of them were male students. The large gap may have caused the total results to lean

toward the female side. Moreover, some bias may exit due to this gap. Since this survey used a volunteer sample of convenience, the male students may have participated due to their interest in climate change issues, or they may have already had a high level of knowledge and perceptions about this topic. The students who chose not to participate may have done so because they weren't interested or didn't have much climate change knowledge. Second, most of the participants are from tourism/outdoor recreation/environment related majors (51.18%), or have tourism major classes, which means they might already have had climate change related knowledge.

Third, the participants were introduced to the topic and the purpose of the survey during the data collection process of the study. As this study utilized a Likert-type, self-report survey method. It is possible that the survey method may have introduced response bias among the participants (Randall & Fernandes, 1991). Individuals have a tendency to conform to societal norms and to deny socially undesirable traits and behaviors (Nederhof, 1985; Randall & Fernandes, 1991; Zerbe & Paulhus, 1987). Thus, in this study, it is possible that the participants might present themselves in a favorable light, regardless of their "true" knowledge and perceptions toward climate change issues.

Recommendation for Future Study

Future work could use a randomized sample that is a more accurate cross-section of students to confirm whether the findings here are replicable among a more spatially distributed sample. In this study, students were all undergraduates and the majority of them are in tourism, recreation, and environment related majors. For future studies, more students of various backgrounds should be chosen in order to make the results more representative. In this study, a convenience sampling method was used, and most of the

participants had similar education backgrounds. In this study, the educational class level has some impacts on climate change knowledge and perceptions. Thus, the results of this study might be influenced by students' majors. For future studies, the sample population could include participants with different majors and education backgrounds in order to get more representative results. Alternatively, a study could be conducted in which a larger age group, and varied education background sample may be used in order to determine which socio-demographic factors most influence the knowledge and perceptions of climate change.

Future studies could focus on investigating the reason that people are reluctant to change their behavior when it comes to climate change and tourism. Finding ways to help the general public transfer their environmental awareness to pro-environmental behavior is essential for the long-term sustainable development in tourism. Thus, there needs to be measures taken in order to link the climate change and tourism relationship with personal benefits to facilitate the creation of more acceptable climate change policies to reduce the greenhouse gas emissions in tourism.

Also, future studies could focus on enhancing individual's awareness of their roles in climate change. In this study, students considered whether the government has the responsibility for climate change, without considering personal responsibilities and roles. This phenomenon is common in other studies. (Hares, Dickinson, & Wilkes, 2010; Kroesen, 2013; Lorenzoni, Nicholson-Cole, & Whitmarsh, 2007; Semenza et al., 2008). The awareness and concern toward climate change issues may have increased throughout the past decades, but barriers (such as cost, personal awareness and concerns, time consumption, alternative transportation, etc.) continue to be impediments to more

sustainable lifestyles in the general public. Thus, it is important for future studies to focus on establishing suitable strategies to foster public engagement in climate change mitigation and adaptation.

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Appendix I

Research Instruments

Section 1. Please rank the following destination attributes in order of importance from 1 (highest) to 10 (lowest), basing on their level of importance in your travel destination decision-making process. The rank cannot be overlapped.

Measurement Items	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Access to the sea/lakes	1	2	3	4	5	6	7	8	9	10
Accommodation	1	2	3	4	5	6	7	8	9	10
Climate	1	2	3	4	5	6	7	8	9	10
Cuisine	1	2	3	4	5	6	7	8	9	10
Cultural/historical attractions	1	2	3	4	5	6	7	8	9	10
Ease of access	1	2	3	4	5	6	7	8	9	10
Hospitality	1	2	3	4	5	6	7	8	9	10
Nature/landscape	1	2	3	4	5	6	7	8	9	10
Price	1	2	3	4	5	6	7	8	9	10
Sport and leisure activities	1	2	3	4	5	6	7	8	9	10

Section 2. Please answer the following questions, and choose the scales that most closely reflect your point of view.

Question 1: Which comes closest to your own opinion toward climate change?

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Climate change is an inevitable natural process of earth.	0	1	2	3	4
Climate change is caused by the human activities, due to the anthropogenic Greenhouse Gas emission.	0	1	2	3	4

Question 2: Do you think each of the following affects global temperature?

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Volcanic eruptions	0	1	2	3	4
Dust in the atmosphere	0	1	2	3	4
Clouds	0	1	2	3	4
Carbon dioxide	0	1	2	3	4
Greenhouse gases	0	1	2	3	4
Methane	0	1	2	3	4

Question 3: Which of the following do you think contribute to global warming?

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Automobiles/trucks	0	1	2	3	4
Deforestation	0	1	2	3	4
Burning fossil fuel for electricity	0	1	2	3	4
The hole in the ozone layer	0	1	2	3	4
Chlorofluorocarbons	0	1	2	3	4
Greenhouse gases	0	1	2	3	4

Question 4: To what extent, do you think the following are the constitution of greenhouse gases?

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Carbon dioxide	0	1	2	3	4
Methane	0	1	2	3	4
Hydrogen	0	1	2	3	4

Question 5: Do you think the following are the impacts of climate change?

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Food production	0	1	2	3	4
Changes in animal migration	0	1	2	3	4
Changes in ecosystem	0	1	2	3	4
More UV radiation	0	1	2	3	4
An increase in ozone hole size	0	1	2	3	4
Death of coral reef	0	1	2	3	4
Sea-level rise	0	1	2	3	4
Glacial melt	0	1	2	3	4
Arctic ice melt	0	1	2	3	4
Increases in heavy precipitation	0	1	2	3	4
Hot weather	0	1	2	3	4
Decreases in frost days	0	1	2	3	4
Declining snowpack	0	1	2	3	4
More intense droughts	0	1	2	3	4
Increases in wildfires	0	1	2	3	4
Economic impacts	0	1	2	3	4

Question 6: To what extent, do you think your travel influence climate change?

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Car transport	0	1	2	3	4
Cruise ships	0	1	2	3	4
Flying to the destination/Air travel	0	1	2	3	4
Accommodations	0	1	2	3	4

Question 7: Please respond to the following:

Items	Don't Know	Definitely false	Probably false	Probably true	Definitely true
Climate and weather are the same thing.	0	1	2	3	4
Climate changes from year to year.	0	1	2	3	4
The Earth's climate has been the same for thousands of years.	0	1	2	3	4
Climate is the average weather measured over long periods of time.	0	1	2	3	4
The Earth is cooling, not warming.	0	1	2	3	4
Weather changes from year to year.	0	1	2	3	4
Global warming is more beneficial than harmful.	0	1	2	3	4

Question 8: To what extent, do you agree/disagree the following?

Items	Don't Know	Strongly disagree	Disagree	Agree	Strongly agree
Global warming is a very important issue for me.	0	1	2	3	4
I am well informed about the problem of climate change.	0	1	2	3	4
Climate change is not as urgent as other problems (e.g. poverty)	0	1	2	3	4
Probably the effects of climate change will only become visible in dozens of years.	0	1	2	3	4
It is already too late to prevent climate change.	0	1	2	3	4

Media coverage is exaggerated about global warming.	0	1	2	3	4
There is solid evidence that human-induced climate change is occurring.	0	1	2	3	4
Government should established programs to response to climate change.	0	1	2	3	4

Question 9: Where do you receive climate change related information from?

Items	Not at all	A little	Some	A lot
Television	1	2	3	4
Radio	1	2	3	4
Internet	1	2	3	4
Books	1	2	3	4
magazines	1	2	3	4
Newspaper	1	2	3	4
Family/Friends	1	2	3	4
Movies	1	2	3	4
Museums, zoos, aquariums	1	2	3	4
Government agencies	1	2	3	4
Governmental offices, such as NASA	1	2	3	4
Environmental groups	1	2	3	4
Class of university	1	2	3	4
Scientists	1	2	3	4
Public hearing/Events/Lectures	1	2	3	4

Section 3: Please answer the following question and choose the scale that closer to you view.

Question 10: To what extent do you think the following issues affect your consideration of climate change and your travel destination decision-making process?

Items	Don't Know	Strongly disagree	Disagree	Agree	Strongly agree
I consider climate change issues in my travel destination decision-making.	0	1	2	3	4
My contribution is as a drop in the ocean. There is not much I can do.	0	1	2	3	4
I can do little to change my travel behavior.	0	1	2	3	4

Flying is the only option to cover large distances in my travel.	0	1	2	3	4
The cost plays an important role in my travel destination decision making process rather than climate change.	0	1	2	3	4
I find it important to reduce my GHG (Greenhouse Gas) consumption in my travel.	0	1	2	3	4
The continuous growth in consumption is the most important barrier for sustainable development.	0	1	2	3	4

And, if there is any issues that not mentioned in the above question, please write down here: .

Section 4: Your Personal Information

Your gender:

□Male □Female □Other

Your age: _ years old

Your class level:

□Freshman □Sophomore □Junior □Senior □Graduate

Your School/Department (e.g. SPH, SPEA): _

*Your Major*_____

Your Country: _ *State (if you are from US/Canada):* _____

Your Ethnic Group:

□Caucasian □African American □Hispanic/Latino □Asian (or Asian American)

□Native American/Alaska Natives □Other

Your Family's Income Range:

□Less than $20,000 □$20,000-$39,999 □$40,000-$69,999

□$70,000-$99,999 □Above $100,000

Times of travel in the past 2 years: _____